

**Beede Waste Oil Superfund Site RD/RA Consent Decree**

Civil Action No. 1:07-cv-00060-PB

Civil Action No. 1:07-cv-00080-PB

**APPENDIX B**

**RD/RA Statement of Work**

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RD/RA STATEMENT OF WORK**

**BEEDE WASTE OIL SUPERFUND SITE  
NOVEMBER 2006**



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**APPENDIX B  
RD/RA STATEMENT OF WORK**

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**LIST OF ACRONYMS**

AST - Aboveground Storage Tank.  
ARARs - Applicable or Relevant and Appropriate Requirements.  
bgs - below ground surface.  
CD - Consent Decree.  
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act.  
CFR - Code of Federal Regulations.  
COCs - Contaminants of Concern.  
CQAPP - Construction Quality Assurance Project Plan.  
EMP - Environmental Monitoring Plan.  
EPA - Environmental Protection Agency.  
FS - Feasibility Study.  
GMZ - Ground Water Management Zone.  
ICLs - Interim Cleanup Levels.  
MNA - Monitored Natural Attenuation.  
NCP - National Contingency Plan.  
NHDES - New Hampshire Department of Environmental Services.  
O&M - Operations and Maintenance.  
PAH - Polynuclear Aromatic Hydrocarbons.  
PCB - Polychlorinated Biphenyls.  
PHC - Petroleum Hydrocarbons Compounds.  
POE - Point-of-Entry Groundwater Treatment System.  
POP - Project Operations Plan.  
POTW - Publically-owned Treatment Works.  
RCRA - Resource Conservation and Recovery Act.  
RD/RA - Remedial Design/Remedial Action.  
RI - Remedial Investigation.  
ROD - Record of Decision signed by EPA in January 2004.  
SVOC - Semivolatile Organic Compound.  
SOW - Statement of Work.  
TPH - Total Petroleum Hydrocarbons.  
UST - Underground Storage Tank.  
VOC - Volatile Organic Compound.  
WMA - Waste Management Area.  
WP - Work Plan.

**APPENDIX B  
STATEMENT OF WORK**

**BEEDE WASTE OIL SUPERFUND SITE**

**I. INTRODUCTION AND PURPOSE**

This Remedial Design/Remedial Action (RD/RA) Statement of Work (SOW) defines the response activities and deliverable obligations that the Performing Settling Defendants are obligated to perform in order to implement the Work required under the Consent Decree at the Beede Waste Oil Superfund Site in Plaistow, New Hampshire (the Site). The activities described in this SOW are based upon the United States Environmental Protection Agency (EPA) Record of Decision (ROD) for the Site signed by the Director of the Office of Site Remediation and Restoration, New England Region, on January 9, 2004.

**II. DEFINITIONS**

The "Site" shall mean the definition of "Site" as provided in Paragraph IV of the Consent Decree. Other definitions provided in Consent Decree are incorporated herein by reference. In addition, the following definitions shall apply to this SOW:

- A. "Contaminated Groundwater" shall mean groundwater that contains contaminants originating from the Site and is contaminated above Maximum Contaminant Limits (MCLs) or where no Maximum Contaminant Limit has been established, non-zero Maximum Contaminant Limit Goals (MCLGs), or New Hampshire Ambient Groundwater Quality Standards (AGQSs), whichever is more stringent. In the absence of MCLs, non-zero MCLGs, or AGQSs, "contaminated groundwater" shall mean groundwater that has contaminant concentrations above levels that are protective of human health and the environment.
- B. "Design" shall mean an identification of the technology and its performance and operational specifications, in accordance with all applicable federal, state, and local laws, including, but not limited to:
  - 1. computations used to size units, determine the appropriateness of technologies, and the projected effectiveness of the remedial action;

2. scale drawings of all system layouts identified above, including, but not limited to, well logs and geologic cross-sections;
  3. materials handling and system layouts for any excavation and treatment of soils, extraction and treatment of groundwater, and decontamination and demobilization of facilities to include size and location of units, treatment rates, location of electrical equipment and pipelines, and treatment of effluent discharge areas;
  4. quantitative analysis demonstrating the anticipated effectiveness of the Remedial Design to achieve the Component Performance Standards;
  5. technical specifications which detail the following:
    - a. size and type of each major component; and
    - b. required performance criteria of each major component;
  6. description of the extent of environmental and ambient air monitoring including equipment, monitoring locations, and data handling procedures; and
  7. description of access, land easement, and any other institutional controls required to be supplied with the construction plans and specifications.
- C. "EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.
- D. "Groundwater Management Zone" (the "GMZ") is an area designated pursuant to State of New Hampshire Code of Administrative Rules Env-Wm 1403 *Groundwater Management and Groundwater Release Detection Permits* for management of contaminated groundwater.
- E. "Monitored Natural Attenuation" ("MNA") shall mean the reduction of contaminants in groundwater through natural mechanisms in the undisturbed aquifer underlying the Site.
- F. "NHDES" shall mean the New Hampshire Department of Environmental Services and any successor departments or agencies of the State.



- G. "Performing Settling Defendants' Certification" shall mean the following statement: "To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

### **III. SELECTED REMEDY**

The ROD describes the source control and management of migration remedies selected for the Site as specified in Part 2, Section L of the ROD. The following are the components of the remedy to be performed by the Performing Settling Defendants:

- A. Completion of pre-design activities as part of the remedial design phase of work that will include conducting treatability studies, evaluating site access issues, and performing an assessment of the light non-aqueous phase liquid (LNAPL) recovery system, on-site water supply well, and on-site building for potential use as part of the remedy.
- B. Excavation of contaminated surface/shallow soils (generally 0 to 2 feet below ground surface), including on-site soil piles, as well as subsurface soils (discreet areas 2 to 10 feet below ground surface) for off-Site disposal.
- C. Excavation of the on-Site landfill materials for off-Site disposal.
- D. Restoration of on-Site soil and landfill excavation areas.
- E. Excavation of contaminated Kelley Brook sediments for off-Site disposal.
- F. Restoration of Kelley Brook wetlands in the landfill and sediment excavation areas.
- G. Design, construction and operation of a groundwater extraction, treatment, and discharge system to treat contaminated groundwater in the vicinity of source areas and to support dewatering activities necessary for in-situ soil vapor extraction.
- H. Design, construction and operation of a soil vapor extraction (SVE) system to remove contaminants from deep soils which are acting as a continuing source of groundwater contamination. The SVE system may be thermally-enhanced through steam injection as will be determined by treatability studies to be conducted by the Performing Settling Defendants.

- I. Long-term monitoring of sediment and surface water in Kelley Brook.
- J. Long-term monitoring of groundwater quality on- and off-Site.
- K. Long-term monitoring of drinking water quality in on- and off-Site water supply wells.
- L. Monitoring of air quality in structures including residences in the vicinity of the Site as determined necessary by EPA.
- M. Implementing institutional controls to prevent future excavations below a depth of 10 feet on Parcel 1, to prevent use of contaminated groundwater for potable water until the groundwater aquifer has been restored, and to caution the public about the consumption of fish from Kelley Brook until such time as contaminant levels in fish tissue reach safe levels.
- N. Providing data sufficient to allow EPA to perform a review of the Site at least once every five years to assure that the remedial action continues to protect human health and the environment and to perform a review of the Site prior to eventual deletion from the National Priorities List.

#### **IV. PERFORMANCE STANDARDS**

This section defines the performance standards for individual components of the remedy.

The Performing Settling Defendants shall design, construct, operate, monitor, and maintain the remedy in compliance with all statutes and regulations identified in Section L of the ROD and all requirements of the Consent Decree and this SOW.

The Performing Settling Defendants shall utilize local labor and materials to the extent practicable in all design and construction activities.

The Performing Settling Defendants shall achieve the following Performance Standards for the remedy:

##### **A. Performance Standards for Pre-Design Activities**

Pre-design activities necessary for the completion of RD/RA tasks shall be performed by the Performing Settling Defendants. Pre-design activities include conducting treatability studies, evaluating site access issues, and performing an

assessment of the LNAPL recovery system, the on-site water supply well, and the on-site building for potential use as part of the remedy.

1. Two treatability studies (i.e., field scale pilot tests) shall be performed to provide additional data for the final remedial design. These studies shall be performed concurrently by the Performing Settling Defendants to the extent possible. The Performing Settling Defendants' responsibilities for reporting and submitting deliverables related to the treatability studies are outlined in Section V.A.6 and V.A.7 of this SOW.

EPA retains the authority, in consultation with NHDES, to determine and modify the scope and duration of the treatability studies.

The two treatability studies shall include:

- a. Thermal-Enhancement Study - The source control remedy identified in the ROD includes an SVE system to remove volatile organic compounds (VOCs), and some semivolatile organic compounds (SVOCs), from deep soils to prevent leaching to groundwater. A thermal-enhancement treatability study shall be performed to provide data that will enable EPA to review and determine, in consultation with NHDES, the need for thermal enhancement of the SVE system using steam injection wells.

Conceptually, this study will involve the installation of a minimum of approximately three SVE extraction wells and a sufficient number of steam injection wells. Increasing amounts of steam will be applied during the treatability study. VOC removal rates and other factors will be measured.

Pre-design activities for the SVE system are further discussed in remedy component H (Section IV.H of this SOW).

- b. Groundwater Treatment Study - The management of migration remedy identified in the ROD includes constructing a groundwater extraction, treatment, and discharge system to restore the groundwater aquifer beneath the Site to drinking water standards within approximately 15 years and to restore drinking water quality to existing impacted off-Site wells within approximately 5 years. A groundwater treatment treatability study shall be performed by the Performing Settling Defendants to provide data

that will enable EPA to review and determine, in consultation with NHDES, the exact number of extraction wells, the appropriate well locations/depths, the most effective extraction rate, and the most effective effluent discharge method (i.e., an evaluation of the viability of surface water discharge versus groundwater recharge of treated water) before the system is designed.

The groundwater treatment treatability study shall evaluate the hydrogeologic properties of the aquifer needed to design the groundwater extraction, treatment, and discharge system. The groundwater treatability study shall characterize the extracted groundwater quality, evaluate the effectiveness of proposed treatment and discharge processes, and assist in the final selection and sizing of treatment and discharge equipment.

The groundwater treatment treatability study shall include an aquifer pumping test to obtain data (e.g., hydraulic conductivity, specific yield, specific capacity, extent of groundwater capture) relevant to the selection of extraction well design parameters necessary to achieve contaminated groundwater recovery objectives.

The groundwater treatment treatability study shall also evaluate potential impacts to nearby residential drinking water wells caused by dewatering and depression of the water table from the groundwater extraction system. The Performing Settling Defendants shall collect sufficient information to allow EPA to review and determine, in consultation with NHDES, the nature and extent of impacts that the remedial design, construction and operation of the remedy will have on nearby drinking water wells, its associated plumbing and wiring, and its ability to provide potable water to current users. If it is determined that the ability of the nearby residential water supply wells to provide potable water would be compromised as a result of planned RD/RA activities, corrective action (which may include the installation of new wells) shall be taken by the Performing Settling Defendants to rectify any impacts prior to the initiation of the groundwater remedy.

The groundwater treatment treatability study shall also evaluate the extent of additional groundwater extraction, treatment, and discharge needed, if any, for water table depression associated

with the deep soil SVE system. It is anticipated that the water table will need to be lowered in some areas of the Site to allow the SVE system to be most effective in removing contaminants from deep subsurface soils.

Pre-design of the groundwater extraction, treatment, and discharge system is also discussed in remedy component G (Section IV.G of this SOW).

2. The Performing Settling Defendants shall conduct an assessment of the existing LNAPL vacuum extraction system and its components for potential reuse in constructing other parts of the remedy.

Access to the shallow and subsurface soil is currently limited by the 143 extraction wells and piping associated with the existing LNAPL vacuum extraction system. Prior to initiating source control design, an assessment will be made of the LNAPL recovery system's components for use in constructing other parts of the remedy such as the deep soil SVE system and/or the groundwater extraction and treatment system.

3. An active bedrock supply well (WS-2) is located on Parcel 1, near the location of the former office building. This well serves an adjacent property owner's home and was installed by the owner of Parcel 1 to replace the homeowner's contaminated shallow well. The Performing Settling Defendants shall perform a pre-design assessment of the on-Site water supply well to collect sufficient information to allow EPA to review and determine, in consultation with NHDES, the nature and extent of impacts, if any, that the remedial design, construction, and operation of the remedy will have on the supply well, its associated plumbing and wiring, and its ability to provide potable water to its current user.

If it is determined that the ability of the water supply to provide potable water would be compromised as a result of planned RD/RA activities, corrective action shall be taken by the Performing Settling Defendants to remedy any impacts. The EPA retains the authority, in consultation with NHDES, to determine any necessary corrective actions that shall be taken.

4. The Performing Settling Defendants shall conduct an assessment of the existing commercial building on Parcel 1 to determine its condition for possible use during performance of clean-up activities. The assessment shall evaluate the condition of the building's structure, utilities, size,

layout, insulation and other factors as necessary. If deemed adequate, the building may be used to house administrative offices, on-Site laboratories, storage, and/or treatment components associated with the selected remedy.

5. The Performing Settling Defendants shall conduct an evaluation of potential routes of vehicular and pedestrian access to the Site and significant Site areas.

The source control remedy requires as many as 50 trucks per day to travel to and from the Site. The existing Kelley Road entrance is the only access point to the 40.6-acre property. Kelley Road is a narrow residential roadway. Pre-design studies shall evaluate alternative access routes. The objective of this evaluation is to locate additional access points which will minimize impacts to local infrastructure and avoid residential areas, to the extent practicable, such that material can be conveyed to and from the Site in the most efficient, safe and non-disruptive manner possible. This evaluation shall include an analysis of the possibility of constructing a permanent bridge over Kelley Brook from the northern end of Parcel 2 to allow for vehicular and pedestrian access to Old County Road. The evaluation shall collect sufficient data to allow EPA to review and determine, in consultation with NHDES, the most appropriate route(s) of vehicular and pedestrian access and egress to and from the Site and significant Site areas.

The Performing Settling Defendants shall also be required to secure all appropriate on-Site and off-Site access agreements from property owners impacted by the selected vehicular and pedestrian access route(s).

6. The Performing Settling Defendants shall conduct a wetlands functional assessment to assess the existing functions and values of the wetland. The wetlands assessment will provide baseline information for developing design criteria for wetlands restoration. The wetlands assessment shall be conducted as part of pre-design activities and prior to the initiation of sediment excavation activities planned for Kelley Brook.

The pre-design wetlands functional assessment is also discussed in remedy component F (Section IV.F of this SOW).

7. The Performing Settling Defendants shall conduct pre-design investigations of surficial and subsurface soils, soil piles, and Kelley Brook sediments prior to the initiation of excavation and disposal

activities planned at the Site. Pre-excavation sampling and analysis shall be conducted to further delineate the extent/volume of contaminated soil/sediment requiring excavation and to provide disposal characterization data.

The pre-design soil and sediment investigations are also discussed in remedy components B and E (Sections IV.B.2 and IV.E of this SOW).

**B. Performance Standards for Excavation and Disposal of Contaminated Surface/Shallow Soils, Soil Piles, and Subsurface Soils**

The Performing Settling Defendants shall excavate and dispose of contaminated surface and subsurface soils (to a depth of up to 10 feet below ground surface) that exceed the Soil Cleanup Levels identified in the ROD. The excavation and disposal of contaminated surface and subsurface soils shall be conducted in a phased approach in the following sequential order.

1. The Performing Settling Defendants shall complete site clearing and staging activities necessary to prepare the Site for the source control remedy identified in the ROD, including soil excavation activities. The following list of Site clearing and staging activities, and others as determined necessary by EPA, shall be performed:
  - Fence repair;
  - Establish staging and decontamination areas;
  - Decommission, dismantle and remove, in part or in whole, the existing LNAPL vacuum extraction system after the completion of an assessment of the system in accordance with Section IV.A.2 of this SOW;
  - Field survey to establish control for Site excavation boundaries and in-place disposal characterization sampling;
  - Implement erosion control measures around the perimeter of the excavation area;
  - Clear and grub small trees and heavy brush within the excavation area;

- Remove and dispose off-Site sand blast grit pile (approximately 80 cubic yards);
  - Remove the former aboveground storage tank (AST) concrete containment structure, concrete debris from the rubble storage area, and the concrete pad near soil pile No. 8, and dispose off-Site the concrete demolition debris;
  - Remove and dispose off-Site the tire pile located on Parcel 1 (approximately 24 cubic yards);
  - Remove miscellaneous concrete/debris items, including the subsurface oil/water separator located near the southern corner of the newer Site building, the catch basin located adjacent to surface water runoff pit No. 2 (SWRP 2) and the concrete debris from the former concrete-lined tank T-137, with off-Site disposal of concrete demolition debris. Similar additional underground structures may be present and must be removed prior to, or in conjunction with, soil excavation;
  - Protect the buried piping and electrical service for water supply well WS-2 located within the landfill area, as determined to be necessary by the evaluation in Section A.3; and
  - Decommission approximately six monitoring wells located within or adjacent to the landfill and replace them, as determined to be necessary by EPA in consultation with NHDES, upon completion of Site excavation activities.
2. Active remediation of surface/shallow soil contaminants (i.e., 0 to 2 feet below ground surface (bgs)) and subsurface soil contaminants (i.e., 2 to 10 feet bgs) shall be completed by the Performing Settling Defendants via excavation and off-Site disposal. Excavation of surface/shallow and subsurface soil shall proceed with pre-excavation disposal characterization sampling/analysis and excavation in four phases, and conclude with post-excavation confirmation sampling/analysis within each excavation area. The Performing Settling Defendants responsibilities for reporting and submitting deliverables related to pre-excavation characterization sampling and analysis are outlined in Section V.A.4 and V.A.5 of this SOW. The Performing Settling Defendants responsibilities for reporting and submitting deliverables related to post-excavation confirmation



sampling and analysis are outlined in Section VI.A of this SOW. A Demonstration of Compliance Report for Soil and Sediment Excavation shall be submitted by the Performing Settling Defendants in accordance with Section VI.A.11 of this SOW.

The existing asphalt pavement area near the Site entrance/exit to Kelly Road shall remain in place to serve as a convenient equipment staging and decontamination area for the majority of the Site soil excavation activities. Once these activities are completed, equipment shall be relocated to another area of the Site and the asphalt and underlying soil shall be excavated as part of the last excavation phase of shallow soil removal.

The Performing Settling Defendants shall begin excavation with the most highly contaminated areas “hot spots”(Phase I), then address the lesser contaminated surface/shallow soil [i.e., generally 0 to 2 feet bgs] (Phase II), proceed to subsurface contaminated soil [i.e., 2 to 10 feet bgs] (Phase III), and finish with contaminated soil beneath the existing asphalt paved areas (Phase IV). Sequencing excavation based on degree of soil contamination and location on Site limits potential cross-contamination of relatively less contaminated and more contaminated soil and associated increases in volume and disposal costs, and facilitates the flow of equipment/truck traffic on and off the Site.

Once the shallow soil is removed, excavation activities shall address the soil piles.

- a. Phase I - Hot Spot Excavation - The Performing Settling Defendants shall excavate and dispose of surface soil “hot spots” that contain polychlorinated biphenyls (PCBs) and/or metals (primarily lead) at concentrations requiring disposal as Toxic Substances Control Act (TSCA) (i.e., PCB  $\geq$  50 parts per million (ppm) and/or Resource Conservation and Recovery Act (RCRA) hazardous waste. The estimated volume of “hot spot” soils to be excavated is 1,311 cubic yards.

The Performing Settling Defendants shall temporarily stockpile “hot spot” surface soils for disposal characterization sampling and analysis prior to disposal. Based on the results of disposal characterization sampling and analysis, the excavated “hot spot” surface soils will be sent to a TSCA or RCRA Subtitle C facility

or, if non-hazardous (<50 ppm PCBs), to a RCRA Subtitle D facility.

The Performing Settling Defendants shall collect a sufficient number of samples from each completed excavation area for laboratory analysis to confirm removal of soils exceeding the Soil Cleanup Levels identified in the ROD. Laboratory analysis will focus, at a minimum, on PCBs and total lead, which drive the soil cleanup for the Site.

- b. Phase II - Non-Hot Spot Surface/Shallow Soil Excavation - The Performing Settling Defendants shall excavate and dispose of non-“hot spot” surface soils with contaminant concentrations above the Soil Cleanup Levels identified in the ROD, but at concentrations which do not require treatment/disposal as TSCA-hazardous and/or RCRA-hazardous waste. The estimated soil volume of 35,503 cubic yards in this disposal category (i.e. PCBs 1 to 49 ppm, low lead) represents the majority of the contaminated surface/shallow soil volume. This soil is located over the majority of the developed portion of Parcel 1 and the westernmost portion of Parcel 2.

The Performing Settling Defendants shall implement a program of soil sampling and analysis prior to this phase of excavation to further delineate the extent/volume of contaminated soil requiring excavation; to provide disposal characterization data; to eliminate the need to stockpile soil for characterization while awaiting disposal; and to eliminate multiple-step handling of soil and the cost of rapid laboratory turnaround of analytical results needed to expedite removal of stockpiled soil if no pre-characterization sampling was conducted. Pre-excavation sampling shall entail the use of a drill rig to advance soil borings to a typical depth of approximately 2 feet below ground surface. The pre-excavation soil boring program will also encompass sampling/analysis of contaminated soil beneath the asphalt pavement to be removed as part of Phase IV (see Section IV.B.2.d of this SOW). Disposal characterization samples shall be analyzed, at a minimum, for ignitability, corrosivity, reactivity, VOCs, SVOCs, PCBs, total petroleum hydrocarbons (TPH), RCRA metals, and herbicides.

Following Phase II excavation, the Performing Settling Defendants shall perform adequate confirmation sampling and analysis throughout the non-“hot spot” surface soil area to confirm and document the removal of soils exceeding the Soil Cleanup Levels identified in the ROD. Confirmatory samples will, at a minimum, be analyzed for PCBs and total lead, which drive the soil cleanup for the Site.

- c. Phase III - Subsurface Soil Excavation - The Performing Settling Defendants shall excavate and dispose of subsurface soils (i.e., generally 2 to 10 feet below ground surface) which exceed the Soil Cleanup Levels identified in the ROD. These soils are generally located within discreet areas identified as the underground storage tank (UST) / aboveground storage tank (AST), Lagoon, and the surface water runoff pit no. 1/AST source areas as described in the ROD.

As with the non-hot spot shallow soil, the Performing Settling Defendants shall implement a program of soil sampling and analysis prior to this phase of excavation to further delineate the extent/volume of contaminated soil requiring excavation and to provide disposal characterization data. Soil sampling as part of this phase will entail the use of a drill rig to advance soil borings to a depth of approximately 10 feet below ground surface. Analytical results will drive delineation of the extent/volume of excavation. Disposal characterization samples will be, at a minimum, analyzed for ignitability, corrosivity, reactivity, VOCs, SVOCs, PCBs, TPH, RCRA metals, and herbicides.

It is anticipated that a significant volume of subsurface soils requiring excavation will be disposed of as RCRA-hazardous waste due to elevated levels of PCBs. The estimated volume of Phase III soils to be excavated is 11,572 cubic yards, of which an estimated 9,935 cubic yards are anticipated to be disposed of as RCRA-hazardous waste.

Following Phase III excavation, the Performing Settling Defendants shall perform adequate confirmation sampling and analysis throughout the subsurface soil excavation area to confirm and document the removal of soils exceeding the Soil Cleanup Levels identified in the ROD. Confirmatory samples will, at a

minimum, be analyzed for PCBs and total lead, which drive the soil cleanup for the Site.

- d. The Performing Settling Defendants shall excavate and dispose of shallow soils located beneath the paved asphalt area of the Site with contaminant concentrations above the Soil Cleanup Levels identified in the ROD. This phase involves removing the existing asphalt paved area around the newer Site building and excavating the underlying shallow contaminated soil (generally 0 to 2 feet bgs) for off-Site disposal. Although designated as the fourth phase of surface/shallow and subsurface soil remediation, this phase will likely be preceded by excavation of deeper soil contamination (i.e., greater than 2 feet bgs) and possibly the landfill, which would follow Phase III excavation activities described above. Prior to Phase IV excavation, support equipment (e.g. office trailers, decon pads, truck scales) staged on the existing asphalt pavement during preceding remediation activities will need to be relocated to remediated or uncontaminated areas of the Site.

The Performing Settling Defendants shall characterize the asphalt and concrete pads removed prior to excavation and dispose of it as appropriate.

The Performing Settling Defendants shall implement a program of soil sampling and analysis prior to this phase of excavation to further delineate the extent/volume of contaminated soil requiring excavation and to provide disposal characterization data. The pre-excavation soil sampling of surface soils located beneath asphalt paved areas of the site may be conducted concurrent with the Phase II pre-excavation soil sampling effort (see Section IV.B.2.b of this SOW).

The estimated volume of Phase IV soils to be excavated is 2,335 cubic yards.

Following Phase IV excavation, the Performing Settling Defendants shall perform adequate confirmation sampling and analysis throughout the Phase IV excavation area to confirm and document the removal of soils exceeding the Soil Cleanup Levels identified in the ROD. Confirmatory samples will, at a minimum,

be analyzed for PCBs and total lead, which drive the soil cleanup for the Site.

- e. Once the four phases of the soil excavation are complete, the Performing Settling Defendants shall remove and dispose off-Site the seventeen contaminated soil piles present at the Site. The soil piles total approximately 16,000 cubic yards.

Prior to removal, the Performing Settling Defendants shall conduct a field survey to better define the soil pile volumes, which will help determine the number of samples required per pile for disposal characterization. After the volume survey, the Performing Settling Defendants shall temporarily remove soil pile tarpaulins and sample the underlying soil piles for disposal characterization. Disposal characterization samples will, at a minimum, be analyzed for ignitability, corrosivity, reactivity, VOCs, SVOCs, PCBs, TPH, RCRA metals, and herbicides.

Pre-excavation disposal characterization sampling will allow for live loading into dump trucks after laboratory analytical results are obtained. However, soil pile No. 9, will need to be screened to separate debris (i.e. solid waste, boulders, concrete, asphalt) from soil, prior to loading into trucks. Soil pile tarpaulin disposal, including disposal characterization sampling and analysis, shall also need to be included as part of this measure.

Soils that do not exceed the Soil Cleanup Levels identified in the ROD may be reused on-Site for backfill and final grading purposes, as determined appropriate by EPA in consultation with NHDES.

- f. Following removal of the soil piles, the Performing Settling Defendants shall assess the surface and subsurface soils to evaluate the nature and extent of any contaminated soil that may lie underneath the soil piles. The Performing Settling Defendants shall then excavate and dispose off-Site any soil that exceeds the Soil Cleanup Levels identified in the ROD.

**C. Performance Standards for Excavation of On-Site Landfill Materials for Off-Site Disposal.**

The Performing Settling Defendants shall excavate the on-Site landfill, separating and sorting solid waste and soil fill to the extent practicable, dewatering the deepest material, and arranging for the off-Site disposal of excavated solid waste and soil fill that exceed the Soil Cleanup Levels identified in the ROD. The landfill material requiring excavation totals approximately 10,700 cubic yards. Confirmation sampling shall also be performed throughout the on-Site landfill to confirm and document the removal of soils exceeding the Soil Cleanup Levels identified in the ROD.

1. The foundation of a former on-Site building is located over a portion of the former on-Site landfill. The Performing Settling Defendants shall characterize and remove this building foundation and dispose of it as appropriate.
2. Based on available data, the landfill materials have been grouped as follows:
  - Debris/soil mixture (solid waste fill) in landfill located from 0 to 11 feet bgs to where the top of the LNAPL zone is generally encountered;
  - Contaminated vadose zone soils below and in direct contact with the solid waste fill;
  - Solid waste fill in LNAPL zone above the water table; and
  - Solid waste fill and LNAPL zone soils (peat) below the water table.
3. A mixture of solid waste and soil fill is located from 0 to 11 feet below ground surface where the top of an LNAPL zone is generally encountered. The Performing Settling Defendants shall begin the excavation of the landfill by excavating this material and screening this material to separate solid waste debris from soil fill, thereby reducing the volume of solid waste and associated disposal cost. The screened solid waste debris and soil shall be placed in separate temporary storage piles, underlain and covered with tarpaulins, for subsequent disposal characterization sampling and analysis, prior to off-Site disposal.

The Performing Settling Defendants shall also excavate and dispose all soils located below the bottom of the landfill, but above the LNAPL zone,

which have been impacted by the landfill. These soils shall be separately stored for disposal characterization sampling and analysis prior to off-Site disposal.

4. The Performing Settling Defendants shall excavate and dispose of solid waste fill that is located within the LNAPL zone above the water table (approximately two feet thick located 11 to 13 feet below the ground surface). This material shall be separately stored for disposal characterization sampling and analysis prior to off-Site disposal.
5. The Performing Settling Defendants shall excavate, dewater, and dispose of an approximately two-foot thick contaminated peat layer that comprises the lower two feet of the LNAPL zone. The contaminated peat layer is located below the water table and the excavated peat material will require dewatering prior to disposal. Water will be allowed to drain back into the excavation from the excavator bucket for subsequent treatment in the groundwater portion of the remedy, but the peat will likely retain a significant amount of water. The amount of water remaining in the excavated material prior to dewatering is estimated at 50% by volume.

As part of the remedial design, the Performing Settling Defendants shall identify the appropriate option for dewatering contaminated material excavated from below the water table and determine the appropriate option for disposal or treatment of contaminated water generated from the dewatering process. Two proposed options are identified in the ROD. The options for dewatering this material may also be applicable to the dewatering of sediments excavated from Kelley Brook, which is discussed in remedy component E (Section IV.E of this SOW). Regardless of which option is selected, the water may require pre-treatment prior to off-Site disposal at a POTW or will be sent to a hazardous waste facility for disposal.

- a. In the first option, the material would be placed on a drying bed of crushed stone with an underlying tarpaulin for collection of water. Water draining from the material onto the underlying tarpaulin would be pumped to frac tanks for characterization sampling and analysis prior to off-Site disposal. The area of the drying bed would be approximately 150 feet by 150 feet, with a 1-foot thick layer of crushed stone. This area would accommodate the approximately 1,169 cubic yards of excavated material from below

the water table assuming it is piled to an average height of approximately 2 feet.

- b. In the second option for dewatering, excavated material would be loaded directly into roll-off filter containers. Water draining from the material would pass through a filter cloth and screen at the bottom of the container and be pumped to frac tanks for characterization sampling and analysis prior to off-Site disposal. A vacuum truck hose could be connected to the bottom of the containers to assist in dewatering the material and transferring the water to the frac tanks.

The Performing Settling Defendants shall separately store and conduct disposal characterization sampling and analysis of contaminated peat material and dewatering liquids prior to off-Site disposal to determine the appropriate means of disposal.

6. Disposal characterization sampling and analysis for all landfill materials and waters requiring off-Site disposal shall include, at a minimum, ignitability, corrosivity, reactivity, VOCs, SVOCs, PCBs, TPH, RCRA metals, and herbicides.

**D. Performance Standards for Restoration of On-Site Soil and Landfill Excavation Areas**

The Performing Settling Defendants shall perform post-excavation Site restoration activities throughout the on-Site soil and landfill excavation areas.

Post-excavation Site restoration activities shall consist primarily of backfilling and grading excavated areas with clean fill, placement of approximately six inches of topsoil, and seeding. Grading will accommodate planned uses of the property to the extent practical. Trees shall be planted along the western border of Parcel 1 to replace vegetation removed during earlier clearing and grubbing activities. The tree species will be consistent with the general area (i.e., maple, oak or pine). Existing depressions in Site topography associated with SWRP 1, SWRP 2, and the AST containment structure will be filled with on-Site or imported fill and finished with topsoil and seeding.

Non-wetland areas of the landfill excavation shall also be backfilled. Restoration of wetland areas of the landfill excavation area are described in remedy component F (Section IV.F of this SOW).



Uncontaminated Site soil excavated to access contaminated deep soil, which total approximately 65,500 cubic yards temporarily stored on Parcel 2, may be placed back in the excavated areas at the completion of deep soil remediation activities.

Site restoration shall also include approximately 30,000 square feet of asphalt re-pavement around the newer Site building, replacement of any Site fencing removed during excavation, and replacement of monitoring wells, as determined necessary by EPA.

**E. Performance Standards for Excavation of Contaminated Kelley Brook Sediments for Off-Site Disposal**

The Performing Settling Defendants shall excavate and dispose of contaminated Kelley Brook sediments that exceed the Sediment Cleanup Levels identified in the ROD.

1. The Performing Settling Defendants shall excavate a limited area of contaminated sediment, generally located between the existing oil interceptor trench and Kelley Brook (see Figure 1.3 of the ROD). The volume of sediment estimated for excavation is approximately 150 feet long, 50 feet wide, and 4 feet deep (approximately 1,100 cubic yards, in place).

A secondary area of sediment, located about 150 feet downstream of the sediment area described above, contains elevated concentrations of contaminants above the Sediment Cleanup Levels identified in the ROD but will not be removed as EPA has determined that greater impacts would occur from disturbing this area (this evaluation is included as Appendix C of the ROD). However, Kelley Brook sediments and surface waters will be monitored to ensure that contaminant levels are attenuating once the source sediments are removed. This component of the remedy is discussed in remedy component I (Section IV.I of this SOW).

2. The Performing Settling Defendants shall conduct a pre-excavation sampling and analysis program to confirm the limits of sediment excavation required. Sediment samples shall, at a minimum, be analyzed for PCBs, PHCs, arsenic, cadmium, iron, lead, mercury, and molybdenum. The sampling grid and sampling locations shall be surveyed and a sediment sampling report shall be prepared summarizing the results of the sediment sampling program. The Performing Settling Defendants responsibilities for reporting and submitting deliverables related to pre-

excavation characterization sampling and analysis are outlined in Section V.A.4 and V.A.5 of this SOW.

3. The Performing Settling Defendants shall prepare the sediment excavation area to allow equipment and personnel to safely access the area in a manner that minimizes the impact to Kelley Brook and its wetlands. Preparation activities shall include the clearing of heavy brush and small trees, the construction of an access roadway to allow equipment to access the area, and the construction of a temporary roadway on top of a ten- to fifteen-foot wide berm along three sides of the sediment excavation area. The width of the top of the berm shall be sufficient to allow construction equipment to drive along the perimeter of the excavation area. The berm shall be constructed of an approximately two-foot thick gravel base overlain by geotextile/drainage fabric and approximately 1 foot of crushed stone.

After the berm is constructed, sheet piling will be driven on all four sides of the sediment excavation area (approximate 400 foot perimeter) to limit inflow of surface water and groundwater, and to limit transport of contaminated sediment into the Kelley Brook wetlands.

4. Sediment excavation shall be accomplished by using an excavator that will move along the perimeter berm and reach into the excavation area to dig out sediment. Water will drain as much as practicable back into the excavation from the sediment in the excavator bucket for subsequent treatment under the groundwater portion of the remedy, but the sediment will likely retain a significant amount of water. The amount of water remaining in the excavated sediment prior to dewatering is estimated at 50% by volume.

During remedial design, the Performing Settling Defendants shall identify the appropriate option for dewatering contaminated sediment excavated from below Kelley Brook and determine the appropriate option for disposal or treatment of contaminated water generated from the dewatering process. The identified options for dewatering this material may also be applicable to the dewatering of material excavated from below the water table in the on-Site landfill. This component of the remedy is discussed in remedy component C.

The Performing Settling Defendants shall separately store and conduct disposal characterization sampling and analysis of excavated sediment and

dewatering liquids prior to off-Site disposal to determine the appropriate means of disposal.

Disposal characterization sampling and analysis for all excavated Kelley Brook sediments and waters requiring off-Site disposal shall include, at a minimum, ignitability, corrosivity, reactivity, VOCs, SVOCs, PCBs, TPH, RCRA metals, and herbicides.

5. The Performing Settling Defendants shall perform adequate confirmation sampling throughout the Kelley Brook sediment excavation area to confirm and document the removal of sediments exceeding the Sediment Cleanup Levels identified in the ROD. The Performing Settling Defendants responsibilities for reporting submitting deliverables related to post-excavation confirmation sampling and analysis are outlined in Section VI.A of this SOW. A Demonstration of Compliance Report for Soil and Sediment Excavation shall be submitted by the Performing Settling Defendants in accordance with Section VI.A.11 of this SOW.

**F. Performance Standards for Restoration of Kelley Brook Wetlands in the Landfill and Sediment Excavation Areas**

The Performing Settling Defendants shall perform wetland restoration activities in the landfill and Kelley Brook sediment excavation areas to restore excavated wetland areas.

1. Prior to excavation activities, the Performing Settling Defendants shall further characterize the existing Kelley Brook wetlands to provide baseline information for developing design criteria for wetlands restoration. Characterization will include collecting information about soils, vegetation, and hydrology. A wetland functional assessment shall be conducted to assess the existing functions and values of the wetland.

The success of wetlands restoration activities will depend in part on a design which ties in the restored wetland area with the existing hydrology of Kelley Brook. Pre-design/design investigation activities shall be focused on obtaining the data needed to achieve this goal.

2. Restoration of wetlands within the landfill and sediment excavation areas adjoining Kelley Brook shall be accomplished by post-excavation grading, importing wetlands soils, planting wetlands vegetation, and modifying surface water flow patterns so that the restored area receives adequate

water. The access roadway berm could largely remain in place; however, if it remains, a channel/culvert will need to be excavated through the berm to connect Kelley Brook with the restored area to allow for flow of water into and out of the wetlands.

If a channel/culvert is excavated through the berm, approximately two feet of imported wetlands soil shall be placed in the bottom of the excavation prior to construction of the channel/culvert, and the area shall be planted with wetlands vegetation. Sheet piling installed in association with sediment excavation activities may assist in surface water management during wetlands restoration activities, but must ultimately be removed.

Based on plant species observed within the existing Kelley Brook wetland, the primary vegetation for the restoration area should include red maple (*Acer rubrum*), speckled alder (*Alnus rugosa*), black willow (*Salix nigra*), silky dogwood (*Cornus amomum*), and winterberry (*Itex verticillata*). Gradual natural revegetation of the area by emergent and fern species may occur over time. Such species may include cattails (*Typha latifolia*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis*), and sensitive fern (*Onoclea sensibilis*).

3. The Performing Settling Defendants shall monitor the restored wetlands annually for no less than five years, most likely in the spring, to assess plant hardiness and mortality. If plant mortality exceeds a certain percentage (typically 25%), supplemental plantings and/or other modifications to the restoration area would need to be performed. The Performing Settling Defendants responsibilities for reporting and submitting deliverables related to wetland monitoring activities are outlined in Section VI.A of this SOW.

EPA retains the authority, in consultation with NHDES, to determine and modify the length and scope of wetland restoration monitoring activities and to determine any necessary supplemental wetland restoration activities.

**G. Performance Standards for Design, Construction and Operation of a Groundwater Extraction, Treatment and Discharge System**

The Performing Settling Defendants shall design, construct and operate a groundwater extraction, treatment and discharge system to treat contaminated

groundwater in the vicinity of on-Site source areas and to support dewatering activities necessary for in-situ soil vapor extraction.

1. The Performing Settling Defendants shall conduct pre-design studies, as outlined in remedy component A (Section IV.A of this SOW), to determine final design parameters for groundwater extraction, treatment processes and effluent discharge. The primary goal of the system is to restore the aquifer beneath the Site to drinking water standards within approximately 15 years and to restore drinking water quality in existing impacted off-Site wells within approximately 5 years.

As outlined in remedy component A (Section IV.A.1.b of this SOW), the groundwater treatment treatability study shall also evaluate potential impacts to nearby residential drinking water wells caused by dewatering and depression of the water table from the groundwater extraction system. The Performing Settling Defendants shall collect sufficient information to allow EPA to review and determine, in consultation with NHDES, the nature and extent of impacts that the remedial design, construction and operation of the remedy will have on nearby drinking water wells, its associated plumbing and wiring, and its ability to provide potable water to current users. If it is determined that the ability of nearby residential water supply wells to provide potable water would be compromised as a result of planned RD/RA activities, corrective action (which may include the installation of new wells) shall be taken by the Performing Settling Defendants to rectify any impacts prior to the initiation of the groundwater remedy. It is estimated that approximately six area private shallow wells will require replacement with deeper bedrock wells to prevent interruption of these private potable water supply wells. The Performing Settling Defendants shall submit proposed well designs to EPA for prior approval, in consultation with NHDES, for any wells requiring replacement, and obtain the necessary access. The Performing Settling Defendants shall install and sample all replacement wells prior to the start-up of the groundwater extraction, discharge, and treatment system.

The ROD contains a conceptual design for the groundwater collection and treatment system; however, the design may vary after completion of pre-design studies. The conceptual design described in the ROD discusses three principal subsystems: a groundwater extraction system, a groundwater treatment system, and a treated groundwater discharge system. The Performing Settling Defendants shall ensure that the pre-design studies and the final design for the groundwater extraction,

treatment, and discharge system meets the objectives identified in the conceptual design described in the ROD. EPA expects that the final design will be similar to the conceptual design outlined in the ROD.

2. The Performing Settling Defendants shall design, construct and operate a groundwater extraction system that effectively captures contaminated groundwater from on- and off-Site locations. The ROD outlines a groundwater extraction system conceptual design based on a groundwater flow modeling study that indicates that extraction from a combination of wells located near the source areas on Parcel 1 and near the residential water supply wells located southeast of Parcel 2 would most effectively capture the groundwater plumes and reduce groundwater cleanup times.
  - a. Specifically, the conceptual design calls for the installation of five extraction wells on Parcel 1 and two extraction wells on Parcel 2. The wells on Parcel 1 are referred to as the “near source” extraction wells, and their purpose is to capture contaminant plumes while they are still close to their sources and relatively shallow. The wells on Parcel 2 are referred to as the “near receptor” extraction wells, and their purpose is to capture contaminated groundwater upgradient of affected residential water supply wells located southeast of Parcel 2 and decrease the length of time that these residential wells remain contaminated. A layout of the conceptual system is depicted on Figure 4.9 of the ROD. The final number and placement of extraction wells will be determined by EPA, after a reasonable opportunity for review and comment by NHDES, based on data collected and additional modeling performed as part of the pre-design study.
  - b. A combined minimum extraction rate of 200 gallons per minute (gpm) is identified in the conceptual design to incorporate a safety factor as an allowance for uncertainty in formation hydraulic conductivity, potential effects of contaminant desorption and dispersion, and other variables. The final groundwater flow rate will be determined by EPA, after a reasonable opportunity for review and comment by NHDES, based on data collected and additional modeling performed as part of the pre-design study.

Each of the groundwater extraction wells shall be equipped with an electrical submersible pump and instrumentation, such as a pressure gauge, water level transducer, and flow meter. The wellheads shall be

completed in a below grade vault or above grade enclosure. The extraction wells shall be piped to the groundwater treatment system via underground piping.

3. The Performing Settling Defendants shall design, construct and operate a groundwater treatment system to reduce contaminant concentrations in the extracted groundwater to levels which are suitable for discharge. Treated groundwater will be returned to the subsurface upgradient of the source areas via a subsurface infiltration system or discharged to Kelley Brook. Final selection of either groundwater or surface water discharge will occur as part of final design and will depend in part on the discharge concentration limits established for each method.

The ROD contains a conceptual design for a groundwater treatment system that consists of flow/contaminant concentration equalization, removal of metals such as iron by chemical precipitation, and removal of VOCs (and other organic compounds) by air stripping and activated carbon adsorption.

- a. Because the subsurface soil has become saturated with the LNAPL, a residual amount of oil will remain in the soil after the LNAPL system has been discontinued. Therefore, oil/water separation is a component of the groundwater treatment system, particularly during in-situ remediation of deeper soils using steam injection as part of the source control remedy. Measures will need to be taken to prevent oil from entering the groundwater treatment system. Oil detection probes shall be installed in the extraction wells to prevent pumping of oil by the groundwater extraction pumps. Oil entering the extraction wells shall be removed by separate oil pumps or vacuum extraction equipment and will be disposed of appropriately off-Site.
- b. The initial treatment steps will focus on the removal of metals such as iron. Influent metals such as iron are expected to be present in extracted groundwater at significantly elevated concentrations compared to background levels. Certain metals would cause fouling and loss of efficiency of treatment equipment for VOC removal (i.e. air strippers and activated carbon), and they could potentially foul a subsurface discharge system.

- c. Extracted groundwater will then enter an equalization/pre-aeration tank. The equalization/pre-aeration tank will provide adequate storage volume to dampen variations in well pumping rates and contaminant concentrations entering the system, allow for partial oxidation of metals, and accept recycle flows from downstream unit processes for further treatment (e.g. sand filter backwash, sludge dewatering water.) Air for tank mixing and oxidation of metals will be provided by blowers.
- d. Following equalization/pre-aeration, groundwater will enter a reaction tank where its pH will be raised to facilitate precipitation of metals. Sodium hydroxide will be added to the reaction tank to increase pH, and coagulant polymer will be added to promote agglomeration of precipitates and production of particles amenable to gravity settling. The reaction tank will be continuously mixed using a propeller-type mixer.
- e. After pH adjustment and coagulant polymer addition, the groundwater will enter a flocculation (slow mix) tank followed by a parallel plate clarifier. The flocculation tank will be gently mixed to promote the formation of larger precipitates. The clarifier will provide quiescent conditions to allow for gravity settling of precipitated metals. Precipitated and settled metals will be drawn off the bottom of the clarifier and conveyed to a sludge dewatering system. The sludge dewatering system is further described below. Clarified groundwater will pass over an overflow weir and continue to the sand filter system.

The purpose of the sand filter system will be to remove finer particulates not removed by clarification, and hence further reduce metals concentrations and limit the potential for fouling of the downstream air strippers, carbon adsorption equipment, and subsurface infiltration system. The sand filter system will be comprised of continuous backwash filter units, which unlike conventional pressure filters, do not require periodic shut down for backwashing. Water for filter backwashing will be obtained from the final effluent of the groundwater treatment system. Dirty backwash water will be returned to the equalization/pre-aeration tank.



- f. After filtration, groundwater will undergo a second pH adjustment step to reduce the pH of the groundwater to a level suitable for discharge. Sulfuric acid will be added to a continuously mixed reaction tank to lower the pH of the groundwater prior to being conveyed to the air stripping system.
- g. To limit fugitive emissions of VOCs during equalization and metals precipitation, each of the tanks associated with these processes will be covered and vented to the vapor-phase carbon adsorption system used to control emissions from the subsequent air stripping process. Further description of the emissions control system is given below.
- h. The objective of the air stripping system will be to reduce the levels of VOCs in the extracted groundwater to concentrations equal to or below their respective AGQS/MCL concentrations. The final design parameters for the air stripping system will be determined by EPA, after a reasonable opportunity for review and comment by NHDES, based on data collected and additional modeling performed as part of the pre-design study.

VOC emissions from the air strippers will be vented to a vapor-phase carbon emissions control system. The carbon units will also treat fugitive VOCs captured from preceding process equipment. Because of the anticipated VOC mass loading onto the carbon, on-Site steam regeneration of the carbon may be incorporated into the system rather than off-Site reactivation/disposal and replacement of carbon. A boiler would be provided to furnish steam for on-Site carbon regeneration. VOC-containing steam would be condensed and separated. Separate phase VOCs would be disposed off-Site as a hazardous waste liquid. VOCs which remain dissolved in the condensed aqueous phase would be recycled to the equalization/pre-aeration tank.

- i. To achieve additional reductions in VOC concentrations and lower SVOC concentrations following air stripping, groundwater will undergo polishing treatment by liquid-phase activated carbon adsorption. Following carbon polishing, the treated groundwater will be filtered with a 0.5 micron filter system to remove any particulate carbon. The treated groundwater will then enter an effluent tank for subsequent transfer to the final discharge location.

Treated groundwater from the effluent tank will also be used for other purposes, including sand filter backwash feedwater and boiler feedwater used to supply steam if on-Site regeneration of vapor-phase carbon is performed, or if steam injection is performed in conjunction with the in-situ SVE.

- j. The groundwater treatment system will also include sludge dewatering equipment. Sludge will be generated as a result of the metals precipitation step. Sludge from the metals precipitation step will be transferred from the clarifier bottom to sludge holding/conditioning tanks. Quicklime (CaO) may be added and mixed with the sludge in the holding/conditioning tanks to enhance its dewatering properties. The conditioned sludge will then be pumped to a recessed-plate filter press where water will be squeezed out of the sludge under high pressure. Water, or filtrate, removed from the sludge will be returned to the equalization/pre-aeration tank. The thickened and dried sludge, or sludge cake, will be transferred to a roll-off container for off-Site disposal. Testing will be conducted as part of pre-design investigations to assess the potential for generating sludge which must be disposed of as hazardous waste, as well as to evaluate sizing parameters for sludge dewatering equipment.

- 4. The Performing Settling Defendants shall construct and operate a treated groundwater discharge system to allow for the discharge of treated groundwater. It is anticipated that treated groundwater will be discharged to the subsurface upgradient of the contaminant source areas via a subsurface infiltration system.

The ROD contains a conceptual design for a treated groundwater discharge system. The conceptual design identifies that the location for subsurface discharge is limited to the wooded western portion of Parcel 1 which is upgradient of the Site plume. Discharge elsewhere on Parcel 1 or Parcel 2 would be too close to contaminant source areas and/or would disturb groundwater plume vertical and horizontal migration pathways (e.g., cause plume to migrate deeper into overburden/bedrock).

- a. The conceptually designed groundwater discharge system consists of large diameter, vertical infiltration wells installed hydraulically upgradient of the contaminant source areas in the western portion of Parcel 1. The infiltration wells are not injection wells; instead,

groundwater piped to the wells will passively infiltrate into the subsurface under the force of gravity only.

- b. The conceptual design calls for treated groundwater to be conveyed to the infiltration well field from the treatment plant via underground header piping, and then distributed to the wells via underground laterals. The distribution piping elevations and connections to the wells would be hydraulically designed to balance the flows to the wells under gravity flow conditions. Valves would be provided at the wells to help regulate and balance the flow to each well. In the event the flow to a well is greater than it can accommodate, the overflow will back up into the distribution piping network and flow into another well.

Final design and selection of the groundwater discharge system will be determined by EPA, after a reasonable opportunity for review and comment by NHDES, based on data collected and additional modeling performed as part of the pre-design study, including consideration of the discharge flow rate. The groundwater treatment pre-design study is also discussed in remedy component A (Section IV.A of this SOW).

5. Upon initiation of the operation of the groundwater extraction, treatment, and discharge system, and during the entire operation of the system thereafter, the Performing Settling Defendants shall monitor the performance of the system and demonstrate that it is meeting all applicable standards. Methods for Monitoring Pump-And-Treat Performance (EPA/600/R-94/123) shall be used as guidance in the design and implementation of system performance monitoring. The Performing Settling Defendants shall adjust the system as necessary to maximize the extraction, treatment and discharge of groundwater.
6. EPA retains the flexibility to modify or enhance the groundwater extraction, treatment and discharge system to increase effectiveness and/or decrease costs and time of operation.
7. In the event that EPA determines that the design or implementation of the groundwater extraction, treatment and discharge system does not meet the Performance Standards of this Section, the Performing Settling Defendants shall implement all modifications and adjustments to the system as directed by EPA.

- 8 At the time that Interim Groundwater Cleanup Levels identified in the ROD and any newly promulgated applicable or relevant and appropriate requirements (ARARs) and modified ARARs which call into question the protectiveness of the remedy have been achieved and have not been exceeded for a period of three consecutive years, a risk assessment shall be performed on all residual groundwater contamination to determine whether the remedial action is protective. The risk assessment of the residual groundwater contamination shall follow EPA procedures and will assess the cumulative carcinogenic and non-carcinogenic risks posed by all detected chemicals (including but not limited to the chemicals of concern) via ingestion and direct contact of groundwater and inhalation of groundwater vapors (i.e., bathing). If, after review of the risk assessment, the remedial action is not determined to be protective by EPA, the remedial action shall continue until either protective levels are achieved, and are not exceeded for a period of three consecutive years, or until the remedy is otherwise deemed protective or is modified. These protective residual levels shall constitute the Final Groundwater Cleanup Levels for this ROD and shall be considered performance standards for the remedial action.

All Interim Groundwater Cleanup Levels identified in the ROD and newly promulgated ARARs and modified ARARs which call into question the protectiveness of the remedy and the protective levels determined as a consequence of the risk assessment of residual contamination, must be met at the completion of the remedial action at the points of compliance. At this Site, Interim Groundwater Cleanup Levels must be attained throughout the entire Site-related plume that extends from Parcel 1 to Parcel 2 and off-Site to eastern abutting properties and is currently bracketed by Kelley Brook to the north. Compliance will be demonstrated by attainment of Interim Groundwater Cleanup Levels, or alternative protective levels as determined above, in all monitoring wells and area supply wells currently associated with the Site plume. This shall include all wells that are a part of the groundwater monitoring system at the Site and at any well that EPA requires to be installed for adequate verification that Interim Groundwater Cleanup Levels have been achieved. EPA has estimated that the Interim Groundwater Cleanup levels will be obtained within 15 years after completion of the source control component.

After the Final Groundwater Cleanup Levels have been met and the remedy is determined to be protective, the groundwater treatment system will be shut down and dismantled. The groundwater monitoring program

will be utilized to collect data for three years after shutdown but before dismantling to ensure that the Final Groundwater Cleanup Levels have been met and the remedy is protective.

**H. Performance Standards for Design, Construction and Operation of a Soil Vapor Extraction System**

The Performing Settling Defendants shall design, construct and operate an in-situ soil vapor extraction (SVE) system to remove primarily VOCs from contaminated deep soils (i.e., soil contaminants greater than 10 feet bgs) which are acting as a continuing source of groundwater contamination.

The ROD contains a conceptual design for a SVE system. The primary goal of the system is to remove VOCs in deep soils to levels so that concentrations of contaminants leaching through the soil do not exceed groundwater cleanup standards. The SVE system will be operated to remove VOCs, and some SVOCs, from deep soil by inducing air flow through contaminated soil zones, mass transfer of these contaminants to the vapor phase, and extraction of vapors via vertical wells connected to a vacuum blower. The conceptual design described in the ROD includes two principal system enhancements: a water table depression (groundwater extraction) and treatment system, and a thermal-enhanced via steam injection system. EPA expects that the final design of the SVE system will be similar to the conceptual design outlined in the ROD.

1. The Performing Settling Defendants shall conduct pre-design studies, as outlined in remedy component A, prior to completing a final design for the SVE system. The pre-design studies shall collect sufficient information to determine final design parameters for the SVE system. The SVE pre-design study shall consist of a thermal-enhancement treatability study to provide data that will enable EPA to review and determine, in consultation with NHDES, the need for thermal enhancement of the SVE system using steam injection wells. The Performing Settling Defendants shall ensure that the pre-design studies and the final design for the SVE system meets the objectives identified in the conceptual design described in the ROD.
2. The ROD contains a conceptual design for a SVE system. The conceptual SVE system consists of 100 4-inch diameter vacuum extraction wells, including about 70 vacuum wells installed at the centers of a 50-foot by 50-foot grid over an approximate 4-acre area, with an additional 30 vacuum wells installed around the perimeter to maintain vapor flow toward the clean-up area. Wells will typically be screened over a 10-foot interval from 15 to 25 feet bgs. The construction material for the wells and associated piping (i.e., PVC or steel) will be determined following conclusion of the thermal-enhancement treatability study. Additional soil

samples may be collected during the design phase to more accurately define the extent and depth of soil requiring treatment.

The SVE wells will be connected to the vacuum blower system via above ground piping (PVC or steel.) The vacuum blower system will consist of positive displacement-type vacuum blowers located in an equipment enclosure.

The conceptual layout of the SVE system, with thermal-enhancement via steam injection, is shown in Figure 4.4 of the ROD. Approval of the final design of the SVE system will be made by EPA, in consultation with NHDES, after a reasonable opportunity for review and comment by NHDES.

3. The Performing Settling Defendants shall design, construct, and operate appropriate vapor emission control systems for the SVE system. The conceptual design outlined in the ROD calls for vapor-phase activated carbon to be used for the control of VOC emissions from the SVE system with activated carbon vessels replaced as necessary and spent carbon vessels sent off-Site for recycling or disposal as appropriate.

If thermal-enhancement of the SVE system via steam injection is deemed necessary, activated carbon vessels could be regenerated on-Site. VOC-laden steam resulting from carbon regeneration would be condensed and separated. Separate-phase liquid VOCs would be disposed off-Site as a hazardous waste. Condensed water containing dissolved VOCs would be pumped to the on-Site groundwater treatment system for treatment and discharge.

4. The Performing Settling Defendants shall design, construct, and operate a water table depression (groundwater extraction), treatment, and discharge system. Because the LNAPL zone extends 8 to 10 feet or more below the ambient water table in some Site locations, installation and operation of a water table depression system via groundwater extraction is necessary. Although some lowering of the water table will occur due to the operation of the groundwater extraction, treatment, and discharge system for groundwater restoration, groundwater modeling performed during the Feasibility Study indicates that additional groundwater extraction will be necessary to achieve adequate dewatering of the LNAPL zone beneath the UST/AST and Lagoon source areas on Parcel 1.

The conceptual design of the SVE system outlined in the ROD includes the installation of 5 additional extraction wells, beyond those included for groundwater restoration, specifically for water table depression. The specific number and location for the water table depression wells will be determined during pre-design studies. Extracted groundwater will be treated and discharged using the on-Site groundwater treatment and discharge system, described in remedy component G (Section IV.G of this SOW). These wells may be turned off at the completion of the in-situ treatment of deep soil or may be used as part of the groundwater extraction, treatment, and discharge system described in remedy component G (Section IV.G).

5. Because VOCs are primarily present in waste oil located in the deeper vadose and smear zone soils, thermal-enhancement of the SVE system using steam injection may be required. The addition of heat and the resulting increase in subsurface temperature would lead to a considerable increase in contaminant recovery rate, which in turn could result in a significant reduction of the cleanup time frame as compared to non-thermally-enhanced SVE. As stated previously, the Performing Settling Defendants shall conduct pre-design studies consisting of a thermal-enhancement treatability study to determine the need for thermal enhancement of the SVE system using steam injection wells. As noted in the ROD, steam injection has been determined as the preferred method of thermal enhancement.

A conceptual design for the steam injection system is outlined in the ROD. The conceptual design consists of injection wells installed over the areal extent of deep soil contamination. This area is approximately 4 acres, as estimated in the Remedial Investigation, and is assumed to coincide with the Lagoon and UST/AST/SWRP 2 source area smear zones, including the smear zone within the landfill.

As conceptually designed, approximately 70 2-inch diameter steam injection wells would be installed on a 50-foot by 50-foot grid pattern over the 4-acre area. An additional 30 or so wells would be installed directly below the Lagoon and AST/UST/SWRP 2 source areas extending over approximately 1 acre. The total steam injection rate is estimated to be 15,000 pounds per hour (lbs/hr). The final design parameters for the steam injection wells, including the number of wells, well layout, screened interval, and steam injection rate and pressure will be assessed by field pilot testing as part of the pre-design investigations.



The steam injection wells would be connected to a steam boiler system via a network of aboveground, insulated, steel distribution piping. The boiler(s) could also be used to provide steam for on-Site steam desorption of the vapor-phase activated carbon associated with SVE emissions controls as further described previously in remedial component H.3.

The utilities required to operate the steam boiler system would include fuel, water, and electricity. An aboveground, steel tank with secondary containment and leak detection would be required for fuel oil storage.

The final decision regarding the use of steam injection will be made by EPA, in consultation with NHDES, after a reasonable opportunity for review and comment by NHDES, based in part on results of a thermal enhancement pre-design treatability study described previously.

6. EPA retains the flexibility to modify or enhance the SVE system to increase effectiveness and/or decrease costs and time of operation.
7. In the event that EPA determines that the design or implementation of the SVE system does not meet the Performance Standards of this Section, the Performing Settling Defendants shall implement all modifications and adjustments to the system as directed by EPA.
8. The SVE system shall operate until the Soil Cleanup Levels for the Aquifer Based on Leaching as identified in the ROD are met. The Performing Settling Defendants shall confirm that the Soil Cleanup Levels for the Aquifer Based on Leaching have been met by conducting confirmatory soil sampling and analysis. Confirmatory sampling will include the collection of continuous soil samples beginning at 10 feet bgs, or from above the LNAPL zone interface, proceeding to the bottom of the LNAPL zone. Soil samples shall be collected when contaminant mass removal by the SVE system approaches a low, relatively asymptotic rate as compared to removal rates attained over the operational period of the system.

The Performing Settling Defendants responsibilities for reporting and submitting deliverables related to SVE confirmation sampling and analysis are outlined in Section VI.A of this SOW.

9. The Performing Settling Defendants shall not discontinue operation of the SVE system until the clean-up of deep soils to levels below Soil Cleanup

Levels for the Aquifer Based on Leaching has been confirmed and until EPA has directed the Performing Settling Defendants to discontinue operation of the SVE system. A Demonstration of Compliance Report for Soil Vapor Extraction shall be submitted by the Performing Settling Defendants in accordance with Section VI.A.12 of this SOW.

**I. Performance Standards for Long-Term Monitoring of Sediment and Surface Water in Kelley Brook**

The Performing Settling Defendants shall conduct long-term monitoring of sediment and surface water in Kelley Brook to evaluate on-going and future sediment and surface water quality and impacts. The Performing Settling Defendants responsibilities for reporting and submitting deliverables related to Kelley Brook sediment and surface water monitoring activities are outlined in Section VI.A of this SOW.

1. The Performing Settling Defendants shall conduct long-term monitoring of sediment and surface water in Kelley Brook consisting of annual sampling and analysis. Surface water samples shall be analyzed for volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), and metals. Sediment samples shall be analyzed for VOCs, PAHs, PCBs, and metals. The sampling locations will generally coincide with a subset of the sediment and surface water sampling locations identified in the Remedial Investigation Report.
2. EPA retains the authority, in consultation with NHDES, to determine the duration of long-term sediment and surface water monitoring and to modify the scope (i.e., sampling locations, number of sampling locations, analytical parameters) of the Kelley Brook long-term sediment and surface water monitoring program.

**J. Performance Standards for Long-Term Monitoring of Groundwater Quality On- and Off-Site**

Natural attenuation of selected source areas/contaminated groundwater plumes is a component of the selected remedy. These source areas/plumes include the solvent distillation unit source/plume, SWRP 1 source/plume and that portion of the UST/AST/SWRP 2 plume, which discharges to Kelley Brook. Clean up goals should be attained in approximately 15 years consistent with the active pumping portion of the remedy.

A comprehensive monitoring program will be performed to evaluate changes to the plume and measure the effectiveness/success of the source control and management of migration remedies. Monitoring well samples are to be collected using the low-flow technique. Samples are to be analyzed, at a minimum, for VOCs and other COCs. The actual number, frequency, parameters and sampling and analytical methods for the groundwater monitoring program will be determined by EPA, after a reasonable opportunity for review and comment by NHDES, during the pre-design phase. The Performing Settling Defendants responsibilities for reporting and submitting deliverables related to groundwater monitoring activities are outlined in Section VI.A of this SOW.

The Performing Settling Defendants shall maintain and repair groundwater monitoring wells that are part of the comprehensive groundwater monitoring program. Periodic monitoring and necessary repair, maintenance, or replacement shall be performed by the Performing Settling Defendants.

**K. Performance Standards for Long-Term Monitoring of Drinking Water Quality In On- and Off-Site Water Supply Wells.**

A comprehensive residential monitoring program will be performed to ensure the continued quality of drinking water in off-Site supply wells and the continued effectiveness of the POE treatment units. Currently, between 10 to 20 residential supply wells are sampled quarterly. A more comprehensive round of about 60 residential supply wells ringing the Site are sampled every three years. Samples are analyzed for VOCs and natural attenuation parameters. The actual number, frequency, parameters and sampling and analytical methods for the residential monitoring program will be determined by EPA, after a reasonable opportunity for review and comment by NHDES, during the pre-design phase. The Performing Settling Defendants responsibilities for reporting and submitting deliverables related to drinking water monitoring activities are outlined in Section VI.A of this SOW.

**L. Performance Standards for Monitoring of Air Quality in Structures in the Vicinity of the Site as Determined Necessary by EPA**

The Performing Settling Defendants shall monitor air quality in structures within the vicinity of the Site, including residences, if EPA determines it is appropriate to ensure that vapor intrusion of volatile contaminants from contaminated groundwater is not occurring. If unsafe levels are found, mitigation measure will be required as necessary and determined by EPA.

**M. Performance Standards for Implementing Institutional Controls**

The Performing Settling Defendants shall establish institutional controls which are capable of preventing the use of contaminated or potentially contaminated soil and groundwater, the consumption of fish from Kelley Brook, and informing future purchasers of the property of the restrictions associated with the property. The institutional controls shall be enforceable and reliable for long-term protection.

1. Consistent with the source control component of the remedy, impacted areas of soil contamination throughout the Site will be remediated to a depth 10 feet below ground surface, which will allow for unrestricted residential use. However, because contaminants other than VOCs remain below 10 feet and because the State of New Hampshire considers soils to a depth of 15 feet below ground surface to be “potentially accessible,” the Performing Settling Defendants shall place activity and use restrictions (AURs) on Parcel 1 of the Site to prevent future excavations below a depth of 10 feet. No deep soil contamination is present on Parcel 2. The AURs established for Parcel 1 will be permanent unless additional remedial actions, which are beyond the scope of this ROD, are undertaken, as necessary, to address soil contamination below 10 feet.
2. Consistent with the management of migration portion of the remedy, groundwater contamination located within the aquifer beneath the Site will be remediated through an on-Site extraction and treatment system. Institutional controls to prevent exposure to contaminated groundwater are necessary since aquifer restoration will require an estimated 15 years to attain. The Performing Settling Defendants shall establish a Groundwater Management Zone (GMZ), as defined by the State of New Hampshire (Env-Wm 1403), to prevent the installation of new groundwater supply wells by placing restrictions or notifications on the deeds of properties located within the plume area. Delineation of the GMZ is depicted on attached Figure 4.1 of the ROD. Where an alternative water supply is not available, the use of point of entry (POE) treatment systems will continue to ensure the availability of potable water to impacted users.
3. Until such time as contaminant levels in fish tissue reach safe levels, the Performing Settling Defendants shall implement institutional controls such as no fishing signs and education campaigns to minimize ingestion of fish from Kelley Brook. Currently a state fish advisory is in place cautioning about consumption of fish.

**N. Performance Standards for Five-Year Reviews**

Since hazardous materials will remain in groundwater and deeper soil for more than five years from the initiation of the selected remedy, EPA will review the Site at least once every five years after the initiation of remedial action to assure that the remedial action continues to protect human health and the environment. The Performing Settling Defendants shall provide sufficient data, in content and format, and prepare a Five-Year Review Report for EPA to review and finalize at least once every five years to ensure that the remedial action continues to protect human health and the environment.

EPA will also review the Site prior to eventual deletion from the National Priorities List (NPL). The Performing Settling Defendants shall provide data sufficient, in content and format, to allow EPA to perform a review of the Site prior to deletion from the NPL.

**V. REMEDIAL DESIGN**

The Performing Settling Defendants shall develop a final Remedial Design for the remedy described in the ROD and this SOW that meets the Performance Standards specified in Section IV of this SOW. Section V.A. describes the Performing Settling Defendants' responsibilities for submitting deliverables during the Remedial Design. Section V.B. describes the Performing Settling Defendants' responsibilities for conducting Remedial Design Project Meetings.

**A. Deliverables**

The Performing Settling Defendants shall submit to EPA and the NHDES the required deliverables as stated herein for each of the Remedial Design activities. Except where expressly stated otherwise in this SOW, each deliverable shall be subject to review and approval or modification or disapproval by EPA, after a reasonable opportunity for review and comment by NHDES, in accordance with Section XI of the Consent Decree, EPA Approval of Plans and Other Submissions. EPA will consider requests from the Performing Settling Defendants to combine two or more of the deliverables described below into one or more deliverable.

**1. Design Progress Reports**

On the 10th working day of every month beginning in the month EPA approves the Supervising Contractor and until EPA approval of the 100% Design, the Performing Settling Defendants shall submit Design Progress Reports to the EPA and NHDES in accordance with Section X of the Consent Decree, Reporting Requirements. The reports shall summarize all activities that have been conducted in the two months preceding the Design Progress Report and those activities planned for the next two months. The Design Progress Reports shall also identify the current percent design complete, any problems encountered and/or changes to the schedule, and shall summarize all the results of sampling and tests and all other data received by the Performing Settling Defendants.

**2. Remedial Design Work Plan**

Within 45 days after EPA approval of the Supervising Contractor, the Performing Settling Defendants shall submit a Remedial Design Work Plan with Performing Settling Defendants' certification. The Remedial Design Work Plan shall include a comprehensive description of the additional data collection and evaluation activities to be performed, and the plans, reports, and specifications to be prepared.

The Remedial Design Work Plan shall include a description of the pre-design studies specified in this SOW and Section L.2 of the ROD. Consistent with this SOW and Section L.2 of the ROD, the pre-design studies shall include, but not be limited to:

- a. a treatability study to determine the need for thermal enhancement of the SVE system;
- b. a treatability study to determine the design for the groundwater extraction, treatment, and discharge system;
- c. an assessment of the LNAPL extraction system to determine if any of its components can be used in constructing other parts of the remedy;
- d. an assessment of the on-Site water supply well and nearby off-Site water supply wells to determine the extent of impacts to it from remedial design, construction, and remedial actions activities;

- e. an assessment of the existing Site building to determine its possible use during remedial design and remedial action activities;
- f. an evaluation of access routes to the Site and Site areas to determine routes of access that will allow equipment and materials to be conveyed to and from the Site in the most efficient, safe, and non-disruptive manner possible;
- g. a pre-excavation wetland functional assessment to provide baseline information for developing design criteria for wetlands restoration;
- h. a pre-excavation investigation of soil and sediment to further delineate the nature and extent of contaminated soil/sediment requiring excavation and to provide disposal characterization data.

The Remedial Design Work Plan shall include:

- a. a description of each pre-design study to be conducted, a statement of purpose and objectives of the study, and an identification of the specific activities necessary to complete the study;
- b. a comprehensive design management schedule for completion of each major activity and submittal;
- c. a Project Operations Plan (POP). The POP shall consist of:
  - 1. a Site Management Plan (SMP);
  - 2. a Sampling and Analysis Plan (SAP), comprised of a Quality Assurance Project Plan (QAPP) and a Field Sampling Plan (FSP); and
  - 3. a Site-specific Health and Safety Plan (HSP);

The Performing Settling Defendants shall prepare this POP in accordance with Attachment B of this SOW.

Results of the pre-design studies shall be incorporated into the Preliminary Remedial Design Report described in Section V.A.8. of this SOW.

**3. Institutional Control Plan**

Within 60 days after EPA approval of the Supervising Contractor, the Performing Settling Defendants shall submit an Institutional Control Plan. This plan shall detail how the performance standards pertaining to institutional controls (Section IV.M of this SOW) will be met and shall include a schedule for the attainment of the Performance Standards and a plan for the long-term enforcement of institutional controls. This report shall also include the hydrogeological basis for a Groundwater Management Zone around the contaminated area adequate to ensure that new private or public water supply wells in the vicinity would not induce movement of the contaminants into uncontaminated areas or interfere with any remedial action at the Site. This report shall also delineate the GMZ in compliance with NHDES requirements (Env-Ws 1403-14).

Implementation of the Institutional Control Plan will begin within 30 days after EPA approval of the Institutional Control Plan. An Institutional Control Report shall be submitted as part of the Remedial Action Work Plan described in Section VI.A.2.e of this SOW.

**4. Pre-Design Soil and Sediment Investigation Work Plan**

Within 30 days after EPA approval of the Remedial Design Work Plan, the Performing Settling Defendants shall submit a Pre-Design Soil and Sediment Investigation Work Plan. The Pre-Design Soil and Sediment Investigation Work Plan shall include a comprehensive description of the data collection and evaluation activities to be performed, and the plans, reports, and specifications to be prepared. The purpose of the Pre-Design Soil and Sediment Investigation is to further delineate the extent and volume of contaminated soil (including soil piles) and sediment requiring excavation prior to excavation activities occurring and to provide disposal characterization data. Pre-design soil and sediment sampling and analysis is also discussed in Sections IV.B and IV.E of this SOW.

The Pre-Design Soil and Sediment Investigation Work Plan shall describe the field sampling approach, sampling methods, analytical methods, data management and analysis, health and safety procedures, and residual waste management. The data quality objectives for the treatability study shall also be documented.



The Pre-Design Soil and Sediment Investigation Work Plan shall include a schedule for performing the proposed work.

**5. Pre-Design Soil and Sediment Investigation Report**

Within 30 days after the completion of the Pre-Design Soil and Sediment Investigation and in accordance with the schedule outlined in the Pre-Design Soil and Sediment Investigation Work Plan, the Performing Settling Defendants shall summarize the results of the Pre-Design Soil and Sediment Investigation sampling and analysis conducted to delineate the extent and volume of contaminated soil (including soil piles) and sediment requiring excavation in a report submitted to EPA for review and approval or modification or disapproval, after a reasonable opportunity to review and comment by NHDES. Proposed soil and sediment excavation activities shall not occur until EPA has reviewed and approved the pre-excavation soil and sediment investigation report. These activities are described in detail in Section IV.B and IV.E of this SOW.

**6. Treatability Study Work Plans**

Within 30 days after EPA approval of the Remedial Design Work Plan, the Performing Settling Defendants shall submit a Treatability Study Work Plan for each of the treatability studies planned for the pre-design phase of the Remedial Design. The two treatability studies planned as part of pre-design activities are:

- a. a treatability study to determine the need for thermal enhancement of the SVE system, and
- b. a treatability study to determine the design for the groundwater extraction, treatment, and discharge system.

Each treatability study will consist of a field-scale pre-design pilot test. The Treatability Study Work Plans shall include a comprehensive description of the data collection and evaluation activities to be performed, and the plans, reports, and specifications to be prepared.

The Treatability Study Work Plans shall describe the technology to be tested, test objectives, test equipment or systems, treatment process, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and

analysis, health and safety procedures, and residual waste management. The data quality objectives for the treatability study shall also be documented.

The Treatability Study Work Plans shall include a schedule for performing the treatability studies.

**7. Treatability Study Evaluation Reports**

Within 30 days after the completion of each treatability study and in accordance with the schedule outlined in the Treatability Study Work Plans, the Performing Settling Defendants shall prepare and submit a separate Treatability Study Evaluation Report that describes the performance and results of each study.

- a. The thermal enhancement of the SVE system treatability study evaluation report shall evaluate: the performance of the technology compared with the performance measurements established for the study; the technology's effectiveness, implementability, cost, and results compared with the predicted results; the full-scale application of the technology including an analysis of the key parameters affecting full-scale operation.
- b. The groundwater extraction, treatment, and discharge treatability study evaluation report shall evaluate: the appropriate number, location, and depth for extraction wells; the most effective extraction rate; the most appropriate and cost effective technologies to be included in the treatment train; the most effective effluent discharge method (i.e., re-infiltration of treated groundwater to groundwater vs. surface water discharge); the extent of additional groundwater extraction needed, if any, for water table depression associated with the SVE system; the potential impacts to nearby drinking water wells from dewatering activities; and corrective actions necessary to address any impacts to nearby drinking water wells.

**8. Preliminary Remedial Design Report (30% Design Report)**

In accordance with the schedule outlined in the Remedial Design Work Plan, the Performing Settling Defendants shall submit a Preliminary Remedial Design Report to EPA and NHDES for review and comment at

the completion of Pre-Design activities. The Preliminary Remedial Design ends with the completion of approximately 30 percent of the design effort. At this stage, the Performing Settling Defendants shall have field-verified the existing conditions of the Site, as necessary. The Performing Settling Defendants shall provide supporting data and documentation with the Preliminary Remedial Design Report defining the functional aspects of the Remedial Action to prove that the Remedial Action will be effective in meeting the remediation goals and ARARs.

The Preliminary Remedial Design Report shall include, at a minimum:

- a. A Design Criteria Report that defines in detail the technical parameters upon which the design will be based. Specifically, the Design Criteria Report shall include the preliminary design assumptions and parameters, including (1) waste characterization; (2) pre-treating requirements; (3) volume and types of each medium requiring treatment; (4) treatment schemes (including all media and byproducts), rates, and required qualities of waste streams (i.e., input and output rates, influent and effluent qualities, potential air emissions, and so forth); (5) performance standards; (6) long-term performance monitoring and operations and maintenance (O&M) requirements; (7) compliance with all ARARs, pertinent codes, and standards; (8) technical factors of importance to the design and construction including use of currently accepted environmental control measures, constructability of the design, and use of currently acceptable construction practices and techniques.
- b. A preliminary Remedial Action schedule that includes an evaluation of a phased approach to expedite the Remedial Action.
- c. A set of preliminary drawings and schematics that is organized and clear. The preliminary drawings shall include (1) an outline or listing of proposed drawings and schematics; (2) facility representations including a process flow diagram and a preliminary piping and instrumentation diagram; (3) a general arrangement diagram; and (4) site drawings. Engineering drawings shall be submitted in full size and half size reproductions. Standard formats for use in preparing design drawings shall be those described in the *USACE Architect Engineer Manual*.

- d. A Basis of Design Report that provides a detailed description of the evaluations conducted to select the design approach. This report shall include a Summary and Detailed Justification of Assumptions. This summary shall include: (1) calculations supporting the assumptions; (2) a draft process flow diagram; (3) a detailed evaluation of how all ARARs will be met; (4) a plan for minimizing environmental and public impacts; and (5) a plan for satisfying permitting requirements. Information obtained during the treatability studies shall be used to support the development of this report.
- e. A preliminary cost estimate that provides a preliminary evaluation of the costs of all the elements of the Remedial Action. The estimate should be accurate within plus 50 percent and minus 30 percent. The results of any value engineering effort, if performed, shall be described and included as part of the cost estimate.
- f. If the Performing Settling Defendants finds that the Remedial Action being designed differs from the ROD or that an ARAR cannot be met, the Performing Settling Defendants shall describe the issue and recommend technical solutions in a memorandum submitted to EPA.
- g. An evaluation of access, land acquisition, and easement requirements needed to perform the Remedial Action.

**9. Intermediate Remedial Design Report (60% Design Report)**

Within 60 days after the Preliminary Remedial Design Meeting, described in Section V.B. of this SOW and in accordance with the schedule outlined in the Remedial Design Work Plan, the Performing Settling Defendants shall submit an Intermediate Remedial Design Report to EPA and NHDES for review and comment at the completion of approximately 60 percent of the design effort. The Intermediate Remedial Design Report shall consist of a continuation and expansion of the Preliminary Remedial Design Report and shall address comments generated from EPA and NHDES review of the Preliminary Remedial Design Report.

The Intermediate Remedial Design Report shall include, at a minimum:

- a. An updated schedule for implementation of the Remedial Action that identifies the timing for initiation and completion of all critical path tasks. The schedule shall specifically identify duration for completion of the Remedial Action and major milestones.
- b. A set of intermediate plans and specifications for construction, installation, site preparation, and field work standards, including an equipment startup and operator training plan.
- c. A set of intermediate drawings. The Performing Settling Defendants shall submit an outline or listing of drawings: facility representations containing a process flow diagram, a piping and instrumentation diagram, and a control logic table; and continuation and expansion of drawings submitted with the Preliminary Design Report. This submittal shall also include engineering drawings for grading/paving, foundation, and electrical, structural, and mechanical elements, etc.
- d. A revised Basis of Design Report that includes a revised summary of the evaluations conducted to select the design approach. This report shall include a revised Summary and Detailed Justification of Assumptions. This summary shall include: (1) revised design calculations supporting the assumptions; (2) a revised process flow diagram; (3) an updated detailed evaluation of how ARARs will be met; (4) a plan for minimization of environmental and public impacts; (5) a plan for satisfying permitting requirements; (6) an updated evaluation of land acquisition, easement, and access requirements; and (7) heat and mass balances. This report shall also identify the projected O&M requirements and develop an estimate of annual O&M costs.
- e. A revised Remedial Action cost estimate using flow sheets, layouts, and equipment details. The estimate shall be accurate within plus 30 percent and minus 15 percent. The results of any value engineering effort, if performed, shall be described and included as part of the cost estimate.
- f. If the Performing Settling Defendants find that the Remedial Action being designed differs from the ROD or that an ARAR cannot be met, the Performing Settling Defendants shall describe

the issue and recommend technical solutions in a memorandum submitted to EPA.

**10. Pre-Final Remedial Design Report (90% Design Report)**

Within 60 days after the Intermediate Remedial Design Meeting, described in Section V.B. of this SOW, and in accordance with the schedule outlined in the Remedial Design Work Plan, the Performing Settling Defendants shall submit a Pre-Final Remedial Design Report to EPA and NHDES for review and comment. The Pre-Final Design Report shall address comments generated from the EPA and NHDES review of the Intermediate Remedial Design Report. The Pre-Final Remedial Design Report shall function as the draft version of the Final Design Report.

The Pre-Final Remedial Design Report shall include, at a minimum:

- a. A summary of how comments generated from review of the Intermediate Remedial Design Report have been incorporated. Modifications of the design as a result of incorporation of the comments shall be clearly identified.
- b. A final schedule for implementation of the Remedial Action.
- c. A complete set of final construction drawings, plans and specifications (general specifications, drawings, and schematics). The final design plans and specifications must be consistent with the technical requirements of all ARARs. General correlation between drawings and technical specifications is a basic requirement of any set of working construction plans and specifications. Before submitting the specifications, the Performing Settling Defendants shall coordinate and cross-check the drawings and specifications; and complete the proofing of the edited specifications and the cross-checking of all drawings and specifications.

A complete set of construction drawings and specifications as well as a set of one-half size reductions of drawings shall be submitted.

- d. A final Basis of Design Report that incorporate any changes since the Intermediate Remedial Design Report submittal.

- e. A final Remedial Action cost estimate accurate within plus 15 percent and minus 5 percent. The definitive cost estimate should be accompanied by a range estimate and analysis of the project's potential scope, cost, and schedule change during Remedial Action, broken down by work activity. All work items shall be broken down into labor, materials, and equipment and reflect current prices. The final cost estimate shall separately identify contingencies within the defined project scope.
- f. Final bid documents including final drawings and technical specifications, complete cost proposal, and the required schedule.
- g. A draft Operations and Maintenance (O&M) Plan that includes the following:
  - 1. A description of normal operation and maintenance activities including start-up procedures, tasks for operation, tasks for maintenance, prescribed treatment or operation conditions, and schedule for each O&M task.
  - 2. A description of potential operating problems including common and/or anticipated remedies and useful-life analysis of significant components and replacement costs.
  - 3. An O&M Quality Assurance Plan that includes a description of routine monitoring tasks, required laboratory tests and their interpretation, required data collection, and location of monitoring points comprising the points of compliance monitoring.
  - 4. Alternate procedures to prevent releases or threatened releases of hazardous substances, pollutants, or contaminants, which may endanger health and the environment or cause an exceedance of any cleanup standard.
  - 5. Corrective action to be implemented in the event that cleanup standards for ground water, surface water discharges, and air emissions are exceeded and a schedule for implementing these corrective actions.

6. An O&M Safety Plan that includes a description of precautions and necessary equipment for site personnel, safety tasks required in event of systems failure, and safety tasks necessary to address protection of nearby residents.
  7. Description of equipment including the equipment identification numbers, installation of monitoring components, maintenance of site equipment, and replacement schedule for equipment and installed components.
  8. Records and reporting mechanisms required including daily operating logs, laboratory records, records for operating costs, mechanism for reporting emergencies, personnel and maintenance records, and reports to EPA, its designates, and the State.
- h. A Construction Quality Assurance Project Plan (CQAPP). The CQAPP shall be prepared in accordance with "Construction Quality Assurance for Hazardous Waste Land Disposal Facilities" (EPA, October, 1986). At a minimum, the CQAPP shall provide the following elements:
1. Responsibility and authority of all organization and key personnel involved in the remediation action construction
  2. Construction Quality Assurance (CQA) Personnel Qualifications. The contractor shall establish the minimum qualifications of the CQA Officer and supporting inspection personnel.
  3. Inspection Activities. The contractor shall establish the observations and tests that will be required to monitor the construction and/or installation of the components of the Remedial Action(s). The plan shall include the scope and frequency of each type of inspection to be conducted. Inspections shall be required to verify compliance with environmental requirements and include, but not be limited to, air quality and emissions monitoring records, waste disposal records (e.g., RCRA transportation manifests), etc.



Inspections shall also ensure compliance with all health and safety procedures.

4. checklists for the required tests and inspections;
  5. Sampling requirements. The contractor shall establish the requirements for sampling activities including standard operating procedures for sampling and testing, sample size, sample locations, frequency of testing, criteria for acceptance and rejection (i.e., quality assurance and quality control procedures), and plans for correcting problems as addressed in the project specifications.
  6. Documentation. The contractor shall describe the reporting requirements for CQA activities. This shall include such items as daily summary reports and inspection data sheets.
  7. a process for notifying EPA and NHDES and seeking approval for changes to the design; and
  8. a process for responding to significant weather events during construction.
- i. A draft Demonstration of Compliance Plan. The draft Demonstration of Compliance Plan shall detail how the Performing Settling Defendants shall demonstrate that the Performance Standards, including but not limited to all ARARs listed the ROD will be achieved and maintained. The draft Demonstration of Compliance Plan shall also describe the confirmation sampling required to verify that final cleanup levels or standards, as specified in Section IV of this SOW and the ROD, have been achieved. The final Demonstration of Compliance is described in Section VI.A.6 of this SOW and should be referenced during preparation of the draft Demonstration of Compliance Plan to ensure that all required elements are included.

The draft Demonstration of Compliance Plan shall contain at a minimum the following:

1. a description of physical and chemistry tests and parameters to be sampled and analyzed for, a description

- and rationale of sampling locations, a sampling schedule detailing frequency of sampling for each test conducted, and a justification for sampling rationale;
2. an outline of post-excavation confirmation sampling and analysis to confirm the removal of soils exceeding Soil Cleanup Levels identified in the ROD from each excavation area.
  3. an outline of post-excavation confirmation sampling and analysis to confirm the removal of Kelley Brook sediments exceeding Sediment Cleanup Levels identified in the ROD.
  4. an outline of confirmation sampling and analysis to confirm the remediation of deep soils exceeding Soil Cleanup Levels for the Aquifer Based on Leaching using the SVE system.
  5. an outline of sampling and analysis for long-term groundwater monitoring that identifies of the number and location of the monitoring wells to be used, the frequency of sampling, the analytical parameters, and sampling and analytical methods to be used to document groundwater quality.
  6. an outline of the sediment/surface water sampling and wetland assessment evaluations necessary to monitor Kelley Brook after the completion of sediment excavation activities.
  7. an outline of sampling and analysis for long-term residential drinking water well monitoring that identifies the number and location of the residential drinking water wells to be used, the frequency of sampling, the analytical parameters, and sampling and analytical methods to be used to document residential drinking water quality.
  8. an outline of sampling and analysis to monitor the groundwater treatment system to demonstrate compliance with the effluent discharge limits;

9. an outline of a sampling and analysis plan to monitor any air emissions from the groundwater extraction, treatment, and discharge system;
10. an outline of a plan to measure and record, on a continuous basis, the average flow rate from the extraction system;
11. an outline of a plan to monitor the effluent and pumping rates from the groundwater treatment system; and
12. an outline of the reports and deliverables that will be submitted by the Performing Settling Defendants to document compliance with the final cleanup levels or standards, as specified in Section IV of this SOW and the ROD.

**11. Final Remedial Design Report (100% Design Report)**

Within 30 days after the Pre-Final Remedial Design Meeting, described in Section V.B. of this SOW and in accordance with the schedule outlined in the Remedial Design Work Plan, the Performing Settling Defendants shall submit a Final Remedial Design Report with Settling Defendants' Certification to EPA for approval. The Final Remedial Design Report shall address comments generated from the EPA and NHDES review of the Pre-Final Remedial Design Report.

**B. Design Project Meetings**

The Performing Settling Defendants and their Supervising Contractor shall meet, at a minimum on a monthly basis, with EPA and the NHDES during the design phase to discuss the status of the design, present the results of any investigations, and to discuss any issues associated with the development of design.

At least one week prior to each meeting, the Performing Settling Defendants shall submit to EPA and NHDES: (i) an agenda for the meeting; (ii) a summary of the issues that will be discussed; and (iii) any supporting information, including any specific information required for the meeting, as detailed below. In addition to any other meetings, the following is a list of mandatory meetings to be held during the design phase:

**1. Preliminary Remedial Design Meeting**

Within 15 days after submittal of the Preliminary Remedial Design Report, the Performing Settling Defendants and their Supervising Contractor shall schedule a Preliminary Remedial Design Meeting with EPA and NHDES to discuss the Preliminary Remedial Design.

During the Preliminary Remedial Design Meeting, the Performing Settling Defendants shall present the results of all design investigations that have been completed, treatability studies, and the preliminary remedial design of the remedy based on these investigations and the Preliminary Remedial Design Report.

**2. Intermediate Remedial Design Meeting**

Within 15 days after submittal of the Intermediate Remedial Design Report, the Performing Settling Defendants and their Supervising Contractor shall schedule a meeting with EPA and the NHDES. At this meeting, the Performing Settling Defendants shall present the Intermediate Remedial Design, and identify any changes made since the Preliminary Remedial Design Report.

The Intermediate Remedial Design presentation shall cover, at a minimum:

- a. the results of all pre-design studies;
- b. an ARARs Compliance Matrix including a discussion of how ARARs will be met by the design and how performance will be monitored;
- c. a description of the design basis for each component of the design;
- d. prefinal plans, drawings, sketches, and calculations;
- e. outlines of the required technical specifications; and
- f. preliminary construction schedule and costs.

**3. Pre-Final Remedial Design Meeting**

Within 15 days after submittal of the Pre-Final Remedial Design Report, the Performing Settling Defendants and their Supervising Contractor shall schedule a meeting with EPA and NHDES. At this meeting, the Performing Settling Defendants shall present the Pre-Final Remedial Design and draft Demonstration of Compliance Plan and identify any changes made since the Intermediate Design Report.

**4. Other Meetings**

EPA and/or the Performing Settling Defendants may also schedule additional meetings as necessary to discuss any issues that arise during design.

**VI. REMEDIAL ACTION**

The Performing Settling Defendants shall implement the final design for the remedy, as described in the Record of Decision and this SOW that meets the applicable Performance Standards specified in Section IV of this SOW. Section VI.A. describes the Performing Settling Defendants' responsibilities for constructing the remedy, and submitting deliverables during the Remedial Action Phase. Section VI.B. describes the Performing Settling Defendants' responsibilities for conducting Remedial Action Project Meetings.

**A. Deliverables**

The Performing Settling Defendants shall submit to EPA and NHDES the required deliverables as stated herein for each of these Remedial Action activities. Except where expressly stated otherwise in this SOW, each deliverable shall be subject to review and approval or modification or disapproval by EPA, after a reasonable opportunity for review and comment by NHDES, in accordance with Section XI of the Consent Decree, EPA Approval of Plans and Other Submissions. EPA will consider requests from the Performing Settling Defendants to combine two or more of the deliverables described below into one or more deliverables.

**1. Remedial Action Progress Reports**

On the 10th working day of each month during construction and every other month at other times, beginning with the submission of the Remedial Action Work Plan and until EPA approval of the Final Remedial Action

Report, the Performing Settling Defendants shall submit to EPA and NHDES Remedial Action Progress Reports with Performing Settling Defendants' Certification. The Remedial Action Progress Reports shall summarize all activities that have been conducted during each period and those planned for the next period. The Progress Reports shall also:

- a. identify the percent of construction completed;
- b. identify any problems encountered and/or changes to the schedule;
- c. summarize the results of all sampling and tests (including long-term groundwater monitoring, drinking water monitoring, Kelley Brook sediment and surface water monitoring, and Kelley Brook wetland restoration monitoring data) and all other data received by the Performing Settling Defendants (results of sampling and tests may be submitted under separate cover within 30 days of the receipt of data and test results by the Performing Settling Defendants);
- d. identify the status of each component of remedy. If a component of the remedy has been completed since the last Progress Report, the Progress Report shall provide a description and chronology of the activities completed, as-built drawings signed and stamped by a professional engineer, sufficient documentation that the remedy component meets the applicable Performance Standards including sampling results and QA/QC documentation of these results, and certification that the work was performed consistent with the ROD, Consent Decree, Remedial Design plans and specifications, and the Remedial Action Work Plan and POP. The summary of each completed component of the remedy may be submitted as a report under separate cover by the Performing Settling Defendants.
- e. if appropriate, photographs of the Site activities. Photographs shall be labeled with the date, brief description of the activity, weather conditions and direction/orientation of the photograph; and
- f. include the results of any monitoring conducted in accordance with the Demonstration of Compliance Plan described in Section VI.5 of this SOW.

**2. Remedial Action Work Plan**

Within 60 days after EPA approval of the Final Remedial Design Report, the Performing Settling Defendants shall submit a Remedial Action Work Plan for EPA review and approval or modification or disapproval, after a reasonable opportunity for review and comment by NHDES. The Remedial Action Work Plan for implementing the Remedial Action and associated activities shall include a Revised POP and be consistent with the approved Remedial Design.

The Remedial Action Work Plan shall provide a detailed description of all construction activities, operations and maintenance, performance monitoring, and an overall management strategy necessary to implement and complete the Remedial Action. The Remedial Action Work Plan shall contain, at a minimum:

- a. A description of all activities necessary to implement the Remedial Action, in accordance with the approved Remedial Design, the SOW, the Consent Decree and the ROD, including but not limited to the following:
  - 1. award of project contracts, including all agreements with off-Site treatment and/or disposal facilities;
  - 2. contractor mobilization/Site preparation, including construction of necessary utility hookups; and
  - 3. a Contingency Plan which shall specify the measures to be taken in the event of an accident or emergency to protect on-Site construction workers and the local community.
- b. A Revised POP which shall be prepared in support of all fieldwork to be conducted according to the approved Remedial Action Work Plans. The Revised POP shall be consistent with Attachment B of this Statement of Work.
- c. A revised Construction Quality Assurance Project Plan (CQAPP), if necessary.
- d. An Implementation Schedule which shall identify all major milestones for completion of the Remedial Action including the

commencement and completion of construction and the schedule for demonstrating compliance according to the draft Demonstration of Compliance Plan. The Implementation Schedule shall also identify the key construction dates including the initiation and completion date of the remedy. The Implementation Schedule shall also identify the projected dates of the Progress Meetings conducted during the implementation, including those required pursuant to Section VI.B of this SOW.

If, during the construction of the Remedial Action for the Site, conditions warrant modifications of the design, construction, and/or schedules, the Performing Settling Defendants may propose such design or construction or schedule modifications. In accordance with the Consent Decree, the Performing Settling Defendants shall implement the design or construction modifications required.

- e. An Institutional Control Report which shall describe how the Institutional Controls Performance Standards (Section IV.M of this SOW) and the elements of the Institutional Control Plan prepared as part of the Remedial Design (Section V.A.3) were met. The Institutional Control Report shall include a plan for the long-term enforcement of institutional controls.

**3. Pre-Construction Conference**

Within 60 days of receiving EPA's approval or modification of the Remedial Action Work Plan, the Performing Settling Defendants shall hold a pre-construction conference. The participants shall include all Performing Settling Defendants and their representatives, EPA and NHDES.

**4. Initiation of Construction**

Within 30 days after the pre-construction conference, the Performing Settling Defendants shall initiate construction activities as specified in the schedule contained within the Remedial Action Work Plan.



**5. Demonstration of Compliance Plan**

Within 60 days of receiving EPA's approval or modification of the Remedial Action Work Plan, the Performing Settling Defendants shall submit a final Demonstration of Compliance Plan to EPA for review and approval or modification, after a reasonable opportunity for review and comment by NHDES. The Demonstration of Compliance Plan shall describe all activities that will be conducted to provide data necessary for EPA to determine that final cleanup levels or standards, as specified in Section IV of this SOW and the ROD, have been attained and Performance Standards have been met, and both will be maintained. The Demonstration of Compliance Plan shall be a continuation and expansion of the draft Demonstration of Compliance Plan submitted as part of the Pre-Final/Final Remedial Design and described in Sections V.A.10 and V.A.11 of this SOW.

The Performing Settling Defendants shall submit a Demonstration of Compliance Plan that describes in detail all activities that will be conducted to:

- a. Demonstrate compliance with all Performance Standards, and all applicable or relevant and appropriate requirements (ARARs) including;
  - Specify the statute for each ARAR.
  - The citation of the ARAR.
  - Identify if the ARAR is state or federal.
  - Summarize the requirements of the ARAR.
  - Specify in detail all activities that will be conducted to demonstrate compliance with the ARAR.
- b. Demonstrate that all activities have been completed in accordance with design/construction criteria;
- c. Provide adequate monitoring, data collection and analysis, and reporting to assure protectiveness; and
- d. Provide adequate monitoring, data collection and analysis, and reporting to support and perform post-closure human health and ecological risk assessments.

- e. When sampling and analysis is required to demonstrate compliance, the Demonstration of Compliance Plan shall be developed in accordance with the requirements of the Agency's guidance and policies for Monitored Natural Attenuation, Indoor Air, Ground Water Pump-and-Treat, and shall specify:
  - 1. Sampling locations.
  - 2. Sampling frequency.
  - 3. Sampling methods.
  - 4. List of analytes and analytical methods.
  - 5. Data and standard operating procedures for quality assurance and quality control measures.
  - 6. Statistical analysis and/or modeling and/or other data interpretation techniques consistent with EPA guidance and policies.
  - 7. A provision for adequate data gathering and reporting to support and perform post-closure human health and ecological risk assessments.
  - 8. A provision for evaluating the need for Source Control or Management of Migration enhancements to be implemented by the Performing Settling Defendants as directed by EPA.
  - 9. A provision for proceeding with any enhancements as directed by EPA.
- f. The Demonstration of Compliance Plan shall build upon the draft Demonstration of Compliance Plan submitted with the Pre-Final/Final Remedial Design Report described in Sections V.A.10 and V.A. 11 of this SOW and shall contain at a minimum the following:
  - 1. a description of physical and chemistry tests and parameters to be sampled and analyzed for, a description

- and rationale of sampling locations, a sampling schedule detailing frequency of sampling for each test conducted, and a justification for sampling rationale;
2. a post-excavation confirmation sampling and analysis plan to confirm the removal of soils exceeding cleanup standards from each excavation area.
  3. a post-excavation confirmation sampling and analysis plan to confirm the removal of Kelley Brook sediments exceeding cleanup standards.
  4. a confirmation sampling and analysis plan to confirm the remediation of deep soils exceeding Soil Cleanup Levels for the Aquifer Based on Leaching using the SVE system.
  5. a sampling and analysis plan for long-term groundwater monitoring that identifies of the number and location of the monitoring wells to be used, the frequency of sampling, the analytical parameters, and sampling and analytical methods to be used to document groundwater quality.
  6. a sampling and analysis plan for long-term residential drinking water well monitoring that identifies the number and location of the residential drinking water wells to be used, the frequency of sampling, the analytical parameters, and sampling and analytical methods to be used to document residential drinking water quality.
  7. a sediment/surface water sampling and wetland assessment plan to monitor Kelley Brook after the completion of sediment excavation activities.
  8. a sampling and analysis plan to monitor the groundwater treatment system to demonstrate compliance with the effluent discharge limits;
  9. a sampling and analysis plan to monitor any air emissions from the groundwater extraction, treatment, and discharge system;

10. a plan to measure and record, on a continuous basis, the average flow rate from the extraction system;
11. a plan to monitor the effluent and pumping rates from the groundwater treatment system; and
12. a description of the reports and deliverables that will be submitted by the Performing Settling Defendants to document compliance with the final cleanup levels or standards, as specified in Section IV of this SOW and the ROD.

**6. Operations and Maintenance Plan**

The Performing Settling Defendants shall perform the activities necessary to protect the integrity of the remedy and to evaluate system performance. These activities begin during the later stages of construction and ends with the submittal of the Remedial Action Report.

The Performing Settling Defendants shall review and update the draft Operations and Maintenance (O&M) Plan prepared as part of the Remedial Design, as necessary, to include as-built drawing and equipment data sheets. The Performing Settling Defendants shall submit to EPA for review and approval or modification or disapproval, after a reasonable opportunity for review and comment by NHDES, the final Operation and Maintenance Plan no less than 30 days prior to the start of operation of either the SVE system or the groundwater extraction, treatment, and discharge system, whichever starts first. If deemed appropriate, separate O&M plans may be submitted for the SVE system and for the groundwater extraction, treatment, and discharge system. The plan(s) shall include, at a minimum, the following:

- a. a description of normal operations and maintenance;
- b. a description of potential operational problems;
- c. a description of routine process monitoring and analysis;
- d. a description of contingency operation and monitoring;
- e. an operational safety plan;

- f. a description of equipment;
- g. record keeping and reporting requirements;
- h. for the soil vapor extraction system, a well maintenance program including, at a minimum, the following:
  - 1. a provision for prompt and proper abandonment, as appropriate, of wells used during past studies which are currently unusable or which become unusable during the Remedial Action activities; and
  - 2. a provision for inspection, continued maintenance and repair, or abandonment, if necessary, of all wells used during Remedial Action and Operation and Maintenance phases.
- i. for the groundwater extraction, treatment, and discharge system, a well maintenance program including, at a minimum, the following:
  - 1. a provision for prompt and proper abandonment, as appropriate, of wells used during past studies which are currently unusable or which become unusable during the Remedial Action activities; and
  - 2. a provision for inspection, continued maintenance and repair, or abandonment, if necessary, of all wells used during Remedial Action and Operation and Maintenance phases.
  - 3. a provision for inspection, maintenance, and repair or replacement, if necessary, of all point-of-entry (POE) treatment systems.

Sampling and analysis activities described in the Operation and Maintenance Plan shall be performed for the purpose of evaluating general system operation and not for the purpose of demonstrating compliance. Sampling and analysis conducted for the purpose of demonstrating compliance is described in the Demonstration of Compliance Plan for the remedy.

A Revised POP shall be prepared in support of all fieldwork to be conducted according to the Operation and Maintenance Plan and the Demonstration of Compliance Plan for the remedy.

**7. Pre-Final Site Inspections and Reports**

Pre-final site inspections and reports shall be completed at the conclusion of the construction of the: 1. SVE system, and 2. groundwater extraction, treatment, and discharge system.

**a. Pre-Final Site Inspections**

Within 30 days after the Performing Settling Defendants conclude that construction has been fully (100% complete) performed for the relevant remedy component, the Performing Settling Defendants shall schedule and conduct an on-Site Pre-Final Inspection for the completed remedy component.

The Pre-Final Site inspections shall include participants from all parties involved in the Remedial Action, including but not limited to the Performing Settling Defendants and their Supervising Contractor, EPA and NHDES. The meeting shall include an on-site inspection of the completed construction with emphasis on any deficient construction items and a proposed resolution and time frame for correction and a review of as-built plans, drawings, and specifications.

**b. Pre-Final Site Inspection Reports**

Within 14 days after each of the two Pre-Final Site Inspections, the Performing Settling Defendants shall submit a Pre-Final Site Inspection Report to EPA for review and approval or modification or disapproval, after a reasonable opportunity for review and comment by NHDES. The Pre-Final Inspection Reports shall outline the outstanding or deficient construction items (punch list), the actions required to resolve the items, completion dates for the items, a time line for any system shakedown period, and the date of the final site inspection.

**8. Final Site Inspections and Reports**

a. Final Site Inspections

Within 30 days after the submission of the Pre-Final Inspection Reports for the SVE system and the groundwater extraction, treatment, and discharge system, respectively, the Performing Settling Defendants shall resolve the deficient construction items identified in the Pre-Final Site Inspection Reports and ensure that the remedy meets the Performance Standards. Within this time, the Performing Settling Defendants shall schedule and conduct a Final Site Inspection for the relevant remedy component. The Final Site Inspections shall include participants from all parties involved in the Remedial Action, including but not limited to the Performing Settling Defendants and their Supervising Contractor, EPA and NHDES. The Final Site Inspections shall include a discussion of system components and operations, and an on-site inspection and operational demonstration of all the remediation systems. The purpose of the Final Inspection is to certify that the component of the remedy is complete as designed, and are “Operational and Functional.”

b. Final Site Inspection Reports

Within 14 days after each of the two Final Site Inspections, the Performing Settling Defendants shall submit a Final Site Inspection Report to EPA for review and approval or modification or disapproval, after a reasonable opportunity for review and comment by NHDES.

**9. Operations and Maintenance**

Within 14 days of receiving EPA’s approval or modification of the Performing Settling Defendants’ Final Site Inspection Reports, the Performing Settling Defendants shall implement all O&M activities in accordance with the terms and schedules set forth in the O&M Plan(s) approved by EPA.

**10. Interim Remedial Action Report**

Within 60 days after last Final Site Inspection Report, the Performing Settling Defendants shall submit an Interim Remedial Action Report for review and approval or modification or disapproval by EPA, after a reasonable opportunity for review and comment by NHDES. The Interim Remedial Action Report shall include the Performing Settling Defendants' Certification and shall also certify that all construction activities are complete, Performance Standards have been attained, Final Site Inspections have been conducted, and the remedy is operational and functional. The Interim Remedial Action Report shall include at a minimum the following documentation:

- a. chronology of events and procedures used;
- b. tabulation of all analytical data and field notes prepared during the course of the Remedial Design and Remedial Action activities including, but not limited to: monitoring data for the systems effluent and air emissions to conform with ARARs; data on treatment residues; environmental monitoring data collected pursuant to the Demonstration of Compliance Plans specified in Section V.B of this SOW; and QA/QC documentation of these results;
- c. documentation that the applicable Performance Standards have been met including, but not limited to: the sampling/testing locations; frequency of sampling/testing and comparison of test results with the applicable Performance Standards in a tabular form; and QA/QC documentation of these results;
- d. as-built drawings signed and stamped by a professional engineer;
- e. summary of the implementation of the construction quality control plan;
- f. description of the construction activities undertaken;
- g. description and final volumes for all wastes treated, including soil sediment, and groundwater;



- h. documentation of the Pre-Final and Final Site Inspections, including description of the deficient construction items identified during these inspections and documentation of the final resolution of all deficient items;
- i. certification that the work was performed consistent with the ROD, Consent Decree, Remedial Design plans and specifications, the Remedial Action Work Plan and POP, and that the remedy is operational and functional;
- j. schedule for remaining operation and maintenance activities, and compliance monitoring including summary of the O&M Plan and the Demonstration of Compliance Plan, and discussion of any problems/concerns; and
- k. summary of project costs and their comparison with the Remedial Action estimate in the ROD, including the cost of any modifications during construction.

**11. Demonstration of Compliance Report for Soil and Sediment Excavation**

Within 30 days after the completion of soil (including soil piles) and sediment excavation activities, the Performing Settling Defendants shall submit a Demonstration of Compliance Report to EPA for review and approval, after a reasonable opportunity for review and comment by NHDES.

The Demonstration of Compliance Report for Soil and Sediment Excavation shall document that the appropriate cleanup levels or standards, as identified in Section IV of the SOW or in the ROD, and Performance Standards have been met. The Demonstration of Compliance Report shall summarize the data collection and analysis performed to demonstrate compliance. Evidentiary assurances must be provided by the Settling Defendants in the Demonstration of Compliance Report that the appropriate cleanup levels have been attained, that Performance Standards have been met, that appropriate cleanup levels and Performance Standards will be maintained, that all ARARs have been complied with.

**12. Demonstration of Compliance Report for Soil Vapor Extraction**

The Performing Settling Defendants shall not discontinue the operation of the SVE system until the cleanup of deep soils to levels below Soil Cleanup Levels for the Aquifer Based on Leaching identified in the ROD has been confirmed and until EPA has directed the Performing Settling Defendants to discontinue the operation of the SVE system.

The Performing Settling Defendants shall submit a Demonstration of Compliance Report for Soil Vapor Extraction to EPA for review and approval, after a reasonable opportunity for review and comment by NHDES. The Demonstration of Compliance Report for Soil Vapor Excavation shall document that the appropriate cleanup levels or standards, as identified in Section IV of the SOW or in the ROD, and Performance Standards have been met. The Demonstration of Compliance Report shall summarize the data collection and analysis performed to demonstrate compliance. The Demonstration of Compliance Report for Soil Vapor Extraction shall include evidentiary assurances provided by the Performing Settling Defendants that the appropriate cleanup levels have been attained, that Performance Standards have been met, that appropriate cleanup levels and Performance Standards as specified in Section IV of this SOW will be maintained, and that all ARARs have been complied with.

The Demonstration of Compliance Report for Soil Vapor Extraction shall include a petition to EPA to approve the discontinuation of the operation of the soil vapor extraction system when Soil Cleanup Levels for the Aquifer Based on Leaching identified in the ROD have been met. This petition shall be submitted to EPA for approval or modification, after a reasonable opportunity to review and comment by NHDES.

**13. Petition for Discontinuation of Groundwater Extraction, Treatment, and Discharge System**

The Performing Settling Defendants may petition EPA to approve the discontinuation of the operation of the groundwater extraction, treatment, and discharge system when Interim Groundwater Cleanup Levels have been met. This petition shall be submitted to EPA for approval or modification, after a reasonable opportunity to review and comment by NHDES. The petition shall include sufficient data and information to allow EPA and NHDES to review the petition to discontinue the operation

of the system. The petition for shall propose a monitoring program to be followed to demonstrate that the remedy has met the Interim Groundwater Cleanup Levels for three consecutive years after the groundwater extraction, treatment, and discharge system has been discontinued.

If, at any time during the three year period when operation of the groundwater extraction, treatment, and discharge system has been discontinued, the Interim Groundwater Cleanup Levels are no longer being met, the Performing Settling Defendants shall recommence operation and maintenance of the groundwater extraction, treatment, and discharge system. The Performing Settling Defendants may then again petition EPA to discontinue the operation of the groundwater extraction, treatment, and discharge system in accordance with the requirements presented in the preceding paragraph.

During the three year period when operation of the groundwater extraction, treatment, and discharge system has been discontinued, the Performing Settling Defendants shall monitor the integrity and condition of the system.

**14. Final Remedial Action Report**

At the completion of the period necessary to demonstrate compliance and at least one Five Year Review has been documented, the Performing Settling Defendants shall submit a Final Remedial Action Report to EPA for review and approval, after a reasonable opportunity for review and comment by NHDES.

The Final Remedial Action Report shall include evidentiary assurances by the Performing Settling Defendants that the appropriate cleanup levels have been attained, that Performance Standards have been met, that appropriate cleanup levels and Performance Standards as specified in Section IV of this SOW will be maintained, that all ARARs have been complied with, and that O&M is no longer necessary.

The Final Remedial Action Report shall summarize the information contained in the Interim Remedial Action Report and the activities and data collected since the Interim Remedial Action Report. The Final Remedial Action Report shall also include the following element:

- a. A Demonstration of Compliance Report for Groundwater. The Demonstration of Compliance Report for Groundwater shall contain all information necessary to demonstrate compliance. In addition, the Demonstration of Compliance Report for Groundwater shall contain, but not limited to, the following:
  - 1. A detailed summary of the Remedial Design and Remedial Action activities undertaken;
  - 2. Documentation of all sampling locations (including residential drinking water locations), analytical methods and results; the basis for determining that the Performance Standards have been met; QA/QC documentation of these results; the location and frequency of tests and comparison of test results with the performance standards in a tabular form, and otherwise provide attenuation trends, modeling or other data in support of the findings.
  - 3. A human health and ecological risk assessment and all data and quality assurance/quality control requirements that support the human health and ecological risk assessments. The risk assessment of the residual ground water contamination will assess the cumulative risks posed to current and potential future receptors for carcinogens and non-carcinogens through the consumption of Site ground water. The risk assessment will follow EPA Region I guidelines and use site-specific values, reviewed and accepted by EPA, as inputs for the various exposure parameters.

**15. Certification of Completion of Work**

EPA shall review the Final Remedial Action Report. If EPA determines that final cleanup levels or standards, as specified in Section IV of this SOW and the ROD have not been attained or that the Performance Standards have not been achieved, EPA shall notify the Performing Settling Defendants of its disapproval of the Demonstration of Compliance Report. The Performing Settling Defendants shall then perform those activities necessary to correct deficiencies and resubmit the Final Remedial Action Report to EPA for approval, according to a schedule approved by EPA.

If EPA, based on its review of the risk assessments and all other information contained in the Final Remedial Action Report, determines that the risks are within EPA's risk management standard, EPA will issue a Certification of Completion of Work to the Performing Settling Defendants. For groundwater, the Interim Groundwater Cleanup Levels will be deemed protective and will become the Final Groundwater Cleanup Levels for the Site.

**15. Five-Year Review Reports**

Since hazardous materials will remain in groundwater and deeper soil for more than five years from the initiation of the selected remedy, EPA will review the Site at least once every five years after the initiation of remedial action to assure that the remedial action continues to protect human health and the environment. The Performing Settling Defendants shall provide sufficient data and prepare a Five-Year Review Report for EPA to review and finalize at least once every five years to ensure that the remedial action continues to protect human health and the environment.

**B. Meetings During Construction**

The Performing Settling Defendants and their Supervising Contractor shall confer (by telephone or in person, as EPA chooses) bi-weekly with EPA and NHDES regarding the progress and details of construction. These conferences shall start 30 days after EPA approval of the Remedial Action Work Plan and the Revised POP, and continue until EPA determines that the conferences are no longer required or not required for a specified period of time to be determined by EPA.

**VII. SUBMISSIONS REQUIRING AGENCY APPROVAL**

- A. All plans, deliverables, and reports identified in the SOW for submittal to EPA and NHDES shall be delivered to EPA and the NHDES in accordance with the Consent Decree and this SOW.
- B. Any plan, deliverable, or report submitted to EPA and NHDES shall be printed using two-sided printing when possible and marked "Draft" on each page and shall include, in a prominent location in the document, the following disclaimer: "Disclaimer: This document is a DRAFT document prepared under a government Consent Decree. This document has not undergone formal review by EPA and NHDES. The opinions, findings, and conclusions expressed are those of the

author and not those of the U.S. Environmental Protection Agency and the New Hampshire Department of Environmental Services."

- C. Approval of a plan, deliverable, or report does not constitute approval of any model or assumption used by the Performing Settling Defendants in such plan, deliverable, or report.

#### **VIII. COMMUNITY RELATIONS SUPPORT**

The Settling Performing Defendants shall develop a revised Community Relations Plan (CRP) to describe public information and public involvement activities anticipated during the RD/RA. The revised Community Relations Plan shall be submitted to EPA and NHDES for review, prior to the initiation of remedial design/remedial action, and at the same time that the remedial design work plan is submitted.

The Settling Performing Defendants shall review and revise the Community Relations Plan, as deemed necessary by EPA, in consultation with NHDES, and at a minimum, when the remedial action work plan is submitted.

The Performing Settling Defendants shall support the community relations efforts of EPA. This support shall be at the request of EPA and may include:

- A. participation in public informational or technical meetings, including the provision of presentations, logistical support, visual aids, and equipment;
- B. publication and copying of fact sheets or updates;
- C. assistance in placing EPA public notices in print.

**ATTACHMENT A  
SCHEDULE OF REMEDIAL DESIGN/REMEDIAL ACTION  
DELIVERABLES/MILESTONES**

<b><u>Deliverable/Milestone</u></b>	<b><u>Due Date</u></b>
<b><u>REMEDIAL DESIGN</u></b>	
Design Progress Report	On the 10th working day of every month beginning in the month EPA approves the Supervising Contractor and until EPA approval of the 100% Design.
Remedial Design Work Plan	Within 45 days after EPA approval of the Supervising Contractor. The Work Plan shall included a Project Operations Plan (POP) which consists of a Site Management Plan, a Quality Assurance Project Plan, and a Site-specific Health and Safety Plan.
Revised Community Relation Plan	Within 45 days after EPA approval of the Supervising Contractor.
Institutional Control Plan	Within 60 days after EPA approval of the Supervising Contractor.
Pre-Design Soil and Sediment Investigation Work Plan	Within 30 days after EPA approval of the Remedial Design Work Plan
Pre-Design Soil and Sediment Investigation Report	Within 30 days after completion of the Pre-Design Soil and Sediment Investigation and in accordance with the schedule outlined in the Pre-Design Soil and Sediment Investigation Work Plan
Treatability Study Work Plans	Within 30 days after EPA approval of the Remedial Design Work Plan.
Treatability Study	Within 30 days after completion of each treatability

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Evaluation Reports	study and in accordance with the schedule outlined in the Treatability Study Work Plans.
Preliminary Remedial Design Report	At the completion of approximately 30 percent of the design effort and in accordance with the schedule outlined in the Remedial Design Work Plan. Report shall include a Design Criteria Report and a Basis of Design Report.
Preliminary Remedial Design Meeting	Within 15 days after submittal of the Preliminary Remedial Design Report.
Intermediate Remedial Design Report	At the completion of approximately 60 percent of the design effort and within 60 days after the Preliminary Remedial Design Meeting. Report shall include a revised Basis of Design Report.
Intermediate Remedial Design Meeting	Within 15 days after submittal of the Intermediate Remedial Design Report.
Pre-Final Remedial Design Report	Within 60 days after the Intermediate Remedial Design Meeting. Report shall function as a draft version of the Final Remedial Design Report. Report shall include a final Basis of Design Report, a draft Operations and Maintenance Plan, a Construction Quality Assurance Project Plan, and a draft Demonstration of Compliance Plan.
Pre-Final Remedial Design Meeting	Within 15 days after submittal of the Pre-Final Remedial Design Report
Final Remedial Design Report	Within 30 days after the Pre-Final Remedial Design Meeting and in accordance with the schedule outlined in the Remedial Design Work Plan.

**REMEDIAL ACTION**

Remedial Action Progress Reports	On the 10th working day of each month during construction and every other month at other times beginning in the submission of the Remedial Action
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	Work Plan and until EPA approval of the Remedial Action Report.
Remedial Action Work Plan	Within 60 days after EPA approval of the Final Remedial Design Report. The Work Plan shall include a revised Project Operations Plan, a revised Construction Quality Assurance Project Plan, and an Institutional Control Report.
Pre-Construction Conference	Within 60 days of EPA approval of the Remedial Action Work Plan.
Initiation of Construction	Within 30 days of the Pre-Construction Conference.
Demonstration of Compliance Plan	Within 60 days of EPA approval of the Remedial Action Work Plan.
Operations and Maintenance Plan	In accordance with the schedule outlined in the Remedial Action Work Plan and no less than 30 days prior to the start of operation of either the soil vapor extraction system or the groundwater extraction, treatment, and discharge system.
Pre-Final Inspection	Within 30 days after Construction is complete.
Pre-Final Inspection Report	Within 14 days after the Pre-Final Inspection.
Final Site Inspection	Within 30 days after the submission of the Pre-Final Inspection Report.
Pre-Final Inspection Report	Within 14 days after the Pre-Final Inspection.
Operations and Maintenance	Within 14 days of receiving EPA's approval or modification of the Final Site Inspection Reports.
Interim Remedial Action Report	Within 60 days after the submission of the last Final Site Inspection Report.
Demonstration of Compliance Report for Soil and Sediment Excavation	Within 30 days after completion of soil and sediment excavation activities.

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Demonstration of Compliance Report for Soil Vapor Extraction	Prior to discontinuation of operation of the soil vapor extraction system.
Petition for Discontinuation of Groundwater Extraction, Treatment, and Discharge System	Prior to discontinuation of operation of the groundwater extraction, treatment, and discharge system.
Final Remedial Action Report	At the completion of the period necessary to demonstrate groundwater compliance and at least one Five Year Review has been documented. The Report shall include a Demonstration of Compliance Report for Groundwater.
Five-Year Review Report	At least once every five years after the initiation of remedial action activities.
Meetings During Construction	Bi-weekly meetings starting 30-days after EPA approval of the Remedial Action Work Plan. The meetings will continue throughout the construction period.

**ATTACHMENT B  
PROJECT OPERATIONS PLAN**

Before any field activities commence on the Site, the Performing Settling Defendants shall submit several site-specific plans to establish procedures to be followed by the Performing Settling Defendants in performing field, laboratory, and analysis work. These site-specific plans include the:

- A. SITE MANAGEMENT PLAN (SMP)
- B. Sampling and Analysis Plan (SAP), not a separate document, but comprised of:
  - B1. QUALITY ASSURANCE PROJECT PLAN (QAPP)
  - B2. FIELD SAMPLING PLAN (FSP)
- C. HEALTH AND SAFETY PLAN (HSP)

These four volumes form the Site Project Operations Plan (POP). The four components of the POP are described in Sections A through C, herein.

The format and scope of each Plan shall be modified as needed to describe the sampling, analyses, and other activities that are clarified as the RD/RA progresses. EPA may modify the scopes of these activities at any time during the RD/RA at the discretion of EPA in response to the evaluation of RD/RA results, changes in RD/RA requirements, and other developments or circumstances.

**A. Site Management Plan (SMP)**

The Site Management Plan (SMP) shall describe how the Performing Settling Defendants will manage the project to complete the Work required at the Site. The overall objective of the Site Management Plan is to provide EPA and the NHDES with a written understanding of how various project aspects such as access, security, contingency procedures, management responsibilities, waste disposal, budgeting, and data handling are being managed by the Performing Settling Defendants. Specific objectives and provisions of the Site Management Plan shall include, but are not limited to the following:

1. Provide a map and list of properties, the property owners, and addresses of owners to whose property access may be required.
2. Clearly indicate the exclusion zone, contamination reduction zone, and clean area for on-Site activities.

3. Establish necessary procedures and provide sample letters to land owners to arrange field activities and to ensure EPA and NHDES are notified of access-related problems and issues.
4. Provide for the security of government and private property on the Site.
5. Prevent unauthorized entry to the Site, which might result in exposure of persons to potentially hazardous conditions.
6. Establish the location of a field office for on-Site activities.
7. Provide contingency and notification plans for potentially dangerous activities associated with the RD/RA.
8. Monitor airborne contaminants released by Site activities which may affect the local populations.
9. Describe how all Work areas will be maintained and restored to meet all performance standards. Restored areas shall have native vegetation established and not allow erosion.
10. Communicate to EPA, NHDES, and the public the organization and management of the RD/RA, including key personnel and their responsibilities.
11. Provide a list of contractors and subcontractors in the RD/RA and description of their activities and roles.
12. Provide regular financial reports of the Performing Settling Defendants' expenditures on the RD/RA activities.
13. Provide for the proper disposal of materials used and wastes generated during the RD/RA (e.g., drill cutting, extracted groundwater, protective clothing, disposable equipment). These provisions shall be consistent with the off-Site disposal aspects of SARA, RCRA, and applicable state laws. The Performing Settling Defendants, or their authorized representative, or another party acceptable to EPA and NHDES, shall be identified as the generator of wastes for the purpose of regulatory or policy compliance.

14. Provide plans and procedures for organizing, manipulating, and presenting the data generated and for verifying its quality before and during the RD/RA. These plans shall include the description of the proposed computer data base management system which shall be compatible with hardware and software available to EPA Region I and NHDES personnel for handling media-specific sampling results obtained before and during the RD/RA. The description shall include data input fields, examples of data base management output from the coding of all sample data, appropriate quality assurance/quality control to ensure accuracy, and capabilities of data manipulation. The data base management parameters shall be compatible with data storage and analysis systems available to the current EPA Region I and NHDES data storage and analysis systems.

**B. Sampling and Analysis Plan (SAP)**

The SAP shall be consistent with Section VIII of the Consent Decree, Quality Assurance, Sampling, and Data Analysis. The SAP is not a document but instead consists of the following two separate volumes:

- (1) a Quality Assurance Project Plan (QAPP) that describes the policy, organization, functional activities, and the quality assurance and quality control protocols necessary to achieve the data quality objectives dictated by the intended use of the data; and
- (2) the Field Sampling Plan (FSP) that provides guidance for all fieldwork by defining in detail the sampling and data-gathering methods to be used on a project.

The SAP shall be the framework of all anticipated field activities (e.g., sampling objectives, evaluation of existing data, standard operating procedures) and contain specific information on all field work (e.g., sampling locations and rationale, sample numbers and rationale, analyses of samples). During the RD/RA, the SAP shall be revised as necessary to cover each round of field or laboratory activities. The purpose of the SAP is to ensure that sampling data collection activities will be comparable to and compatible with previous data collection activities performed at the Site while providing a mechanism for planning and approving field activities. The overall objectives of the two documents comprising the SAP are as follows:

1. to document specific objectives, procedures, and rationales for fieldwork and sample analytical work;

2. to provide a mechanism for planning and approving Site and laboratory activities;
3. to ensure that sampling and analysis activities are necessary and sufficient; and
4. to provide a common point of reference for all Performing Settling Defendants to ensure the comparability and compatibility of all objectives and the sampling and analysis activities. To achieve this last objective, the SAP shall document all field and sampling and analysis objectives as noted above, as well as all data quality objectives and specific procedures/protocols for field sampling and analysis.

The following critical elements of the SAP shall be described for each sample medium (e.g., ground water, surface water, soil, sediment, air, and biota) and for each sampling event:

1. sampling objectives (e.g., engineering related, well yields, zone of influence, performance monitoring, demonstration of attainment, five year review, etc.);
2. data quality objectives, including data uses and the rationale for the selection of analytical levels and detection limits (see Guidance for the Data Quality Objectives Process, EPA QA/G-4 (EPA/600/r-96/055, September 1994); Draft Data Quality Objectives Decision Errors Feasability Trials (DEFT) Software EPA/600/R-96/056, September 1994); and Final Guidance Data Usability in Risk Assessment (Part A) (publication 9285.7-09A, April 1992, PB92-963356); Guidance for Data Usability in Risk Assessment (Part B). (publication 9285.7-09B, May 1992, PB92-963362).
3. site background update, including an evaluation of the validity, sufficiency, and sensitivity of existing data;
4. sampling locations and rationale;
5. sampling procedures and rationale and references;
6. numbers of samples and justification;

7. numbers of field blanks, trip blanks, and duplicates;
8. sample media (e.g., ground water, surface water, soil, sediment, air, and buildings, facilities, and structures, including surfaces, structural materials, and residues);
9. sample equipment, containers, minimum sample quantities, sample preservation techniques, maximum holding times;
10. instrumentation and procedures for the calibration and use of portable air, soil-, or water-monitoring equipment to be used in the field;
11. chemical and physical parameters in the analysis of each sample;
12. chain-of-custody procedures must be clearly stated (see EPA NEIC Policies and Procedures Manual, EPA 330/9-78 001-R) May 1978, revised May 1986;
13. procedures to eliminate cross-contamination of samples (such as dedicated equipment);
14. sample types, including collection methods and if field and laboratory analyses will be conducted;
15. laboratory analytical procedures, equipment, and detection limits;
16. equipment decontamination procedures;
17. consistency with the other parts of the Work Plan(s) by having identical objectives, procedures, and justification, or by cross-reference;
18. analysis from each medium for all Hazardous Substance List (HSL) inorganic and organic analytes;
19. analysis for other potential site-specific contaminants not on the HSL in each media;
20. analysis of selected background and contaminated ground water samples for substances listed in RCRA Appendix IX, unless the exclusion of certain substances on this list is approved by EPA; and

21. for any limited field investigation (field screening technique), provisions for the collection and laboratory analysis of parallel samples and for the quantitative correlation analysis in which screening results are compared with laboratory results.

The SAP must be the framework of all anticipated field activities (e.g., sampling objectives, evaluation of existing data, standard operating procedures) and contain specific information on each round of field sampling and analysis work (e.g., sampling locations and rationale, sample numbers and rationale, analyses of samples). During the RD/RA, the SAP shall be revised as necessary to cover each round of field or laboratory activities. Revisions or a statement regarding the need for revisions shall be included in each deliverable describing all new field work.

The SAP shall allow for notifying EPA, at a minimum, three weeks before field sampling or monitoring activities commence. The SAP shall also allow split, replicate, or duplicate samples to be taken by EPA (or their contractor personnel) and by other Performing Settling Defendants approved by EPA. At the request of EPA, the Performing Settling Defendants shall provide these samples in appropriately pre-cleaned containers to the government representatives. Identical procedures shall be used to collect the Performing Settling Defendants and the parallel split samples unless otherwise specified by EPA. Several references shall be used to develop the SAP, for example:

1. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (OSWER Directive 9355.3-01, EPA/540/G-89/004, October 1988);
2. Test Methods for Evaluating Solid Waste, Physical/Chemical Method (EPA Pub. SW-846, Third Edition, most recent update);
3. EPA Requirements for Quality Assurance Plans, EPA QA/R-5 (EPA/240/B-01/003) March 2001
4. Region I, EPA-New England Compendium of Quality Assurance Project Plan Requirements and Guidance (U.S. EPA-New England Region I Quality Assurance Unit Staff, Office of Environmental Measurement and Evaluation; October 1999 Final).
5. Guidance for the Data Quality Objectives Process, EPA QA/G-4 (EPA/600/r-96/055, September 1994);



6. Draft Data Quality Objectives Decision Errors Feasibility Trials (DEFT) Software EPA/600/R-96/056, September 1994)
7. Guidance for the Data Quality Objectives Process for Hazardous Waste, EPA QA/G-4HW Draft
8. Guidance for Preparing Standard Operating Procedures (SOPs) EPA QA/G-6 (EPA/240/B-01/004) March 2001
9. Region I, EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses, Revised December 1996
10. Guidance for Data Quality Assessment: Practical Methods for Data Analysis, EPA QA/G-9 (EPA/600/R-96-084, QA 97 Version, January 1998)

**B1. Quality Assurance Project Plan (QAPP)**

The Quality Assurance Project Plan (QAPP) shall document in writing the site-specific objectives, policies, organizations, functional activities, sampling and analysis activities and specific quality assurance/quality control activities designed to achieve the data quality objectives (DQOs) of the RD/RA. The QAPP developed for this project shall document quality control and quality assurance policies, procedures, routines, and specifications.

Project activities throughout the RD/RA shall comply with the QAPP. QAPP sampling and analysis objectives and procedures shall be consistent with EPA Requirements QAPP for Environmental Data Operations (EPA QA/R-5) and appropriate EPA handbooks, manuals, and guidelines including Region I, EPA-New England Compendium of Quality Assurance Project Plan Requirements and Guidance (October 1999 Final)( the “Compendium”), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Pub. SW-846, Third Edition, latest update) (CLP Routine Analytical Services, RAS, latest Statement of Work should be used) and Guidelines Establishing Test Procedures for the Analysis of Pollutants (40 CFR, Part 136), Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, (EPA-600/4-84-041 April 1984)

All the QAPP elements identified in EPA QA/R-5 and the “Compendium” must be addressed.

As indicated in EPA QA/R-5 and the “Compendium”, a list of essential elements must be considered in the QAPP for the RD/RA. If a particular element is not relevant to a project and therefore excluded from the QAPP, specific and detailed reasons for exclusion must be provided.

Information in a plan other than the QAPP may be cross-referenced clearly in the QAPP provided that all objectives, procedures, and rationales in the documents are consistent, and the reference material fulfills requirements of EPA/QA/R-5. Examples of how this cross reference might be accomplished can be found in the Guidance for the Data Quality Objectives Process (EPA/600/R-96/055) and the Data Quality Objectives decision Errors Feasability Trials (DEFT) Software (EPA/600/R-96/056). EPA-approved references, or equivalent, or alternative methods approved by EPA shall be used, and their corresponding EPA-approved guidelines should be applied when they are available and applicable.

#### Laboratory QA/AC Procedures

The QA/QC procedures and SOPs for any laboratory (both fixed and mobile) used during the RD/RA shall be included in the Performing Settling Defendants' QAPP. When this work is performed by a contractor to a private party, each laboratory performing chemical analyses shall meet the following requirements:

1. be approved by the State Laboratory Evaluation Program, if available;
2. have successful performance in one of EPA's National Proficiency Sample Programs (i.e., Water Supply or Water Pollution Studies or the State's proficiency sampling program);
3. be familiar with the requirements of 48 CFR Part 1546 contract requirements for quality assurance; and
4. have a QAPP for the laboratory including all relevant analysis. This plan shall be referenced as part of the contractor's QAPP.

#### Data Validation Procedures

The Performing Settling Defendants are required to certify that a representative portion of the data has been validated by a person independent of the laboratory according to the Region I, EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses Revised December 1996

(amended as necessary to account for the differences between the approved analytical methods for the project and the current Contract Laboratory Program Statements of Work (CLP SOW). A data validation reporting package as described in the guidelines cited above must be delivered at the request of the EPA project manager. Approved validation methods shall be contained in the QAPP.

The independent validator shall not be the laboratory conducting the analysis and should be a person with a working knowledge of or prior experience with EPA data validation procedures. The independent validator shall certify that the data has been validated, discrepancies have been resolved if possible, and the appropriate qualifiers have been provided.

Data Package requirements:

The Performing Settling Defendants must require and keep the complete data package and make it available to EPA on request in order for EPA to conduct an independent validation of the data. The complete data package shall consist of all results, the raw data, and all relevant QA/QC information. The forms contained in the data validation functional guidelines must be utilized to report the data when applicable. Raw data includes the associated chromatograms and the instrument printouts with area and height peak results. The peaks in all standards and samples must be labeled. The concentration of all standards analyzed with the amount injected must be included. All laboratory tracking information must also be included in the data package. An example data package deliverable is listed below:

1. a summary of positive results and detection limits of non-detects with all raw data;
2. tabulate surrogate recoveries and QC limits from methods 3500 and 8000 in SW-846 and all validation and sample raw data;
3. tabulated matrix spike/matrix spike duplicate recoveries, relative percent differences, spike concentrations, and QC limits from methods 3500 and 8000 in SW-846 and all validation and sample raw data;
4. associated blanks (trip, equipment, and method with accompanying raw data for tests);

5. tabulated initial and continuing calibration results (concentrations, calibration factors or relative response factors and mean relative response factors, % differences and % relative standard deviations) with accompanying raw data;
6. tabulated retention time windows for each column;
7. a record of the daily a
8. analytical scheme (run logbook, instrument logbook) which includes samples and standards order of analysis;
9. the chain of custody for the sample shipment groups, *DAS packing slip*, *DAS analytical specifications*;
10. a narrative summary of method and any problems encounter during extraction or analysis;
11. tabulated sample weights, volumes, and % solids used in each sample calculation;
12. example calculation for positive values and detection limits; and
13. SW-846 method 3500 and 8000 validation data for all tests.

The forms contained in Chapter 1 of SW-846 (Second Edition 1982 as amended by Update I, April 1984, and Update II, April 1985) or the current CLP SOW forms must be utilized to report the data when applicable. Raw data includes the associated chromatograms and the instrument printouts with area and height peak results. The peaks in all standards and samples must be labeled. The concentration of all standards analyzed with the amount injected must be included. *All internal and external laboratory sample tracking information must be included in the data package.*

## **B2. Field Sampling Plan (FSP)**

The objective of the Field Sampling Plan is to provide EPA and all Performing Settling Defendants involved with the collection and use of field data with a common written understanding of all field work. The FSP should be written so that a field sampling team unfamiliar with the Site would be able to gather the samples and field information required. Guidance for the selection of field methods, sampling procedures, and custody can be acquired from the

Compendium of Superfund Field Operations Methods (OSWER Directive 9355.0-14, EPA/540/P-87/001), December 1987, which is a compilation of demonstrated field techniques that have been used during remedial response activities at hazardous waste sites. The FSP shall be site-specific and shall include the following elements:

1. Site Background. If the analysis of the existing Site details is not included in the Work Plan or in the QAPP, it must be included in the FSP. This analysis shall include a description of the Site and surrounding areas and a discussion of known and suspected contaminant sources, probable transport pathways, and other information about the Site. The analysis shall also include descriptions of specific data gaps and ways in which sampling is designed to fill those gaps. Including this discussion in the FSP will help orient the sampling team in the field.
2. Sampling Objectives. Specific objectives of sampling effort that describe the intended uses of data must be clearly and succinctly stated.
3. Sampling Location and Frequency. This section of the FSP identifies each matrix to be collected and the constituents to be analyzed. Tables shall be used to clearly identify the number of samples, the type of sample (water, soil, etc.), and the number of quality control samples (duplicates, trip blanks, equipment blanks, etc.). Figures shall be included to show the locations of existing or proposed sample points.
4. Sample Designation. A sample numbering system shall be established for the project. The sample designation should include the sample or well number, the sample round, the sample matrix (e.g., surface soil, ground water, soil boring), and the name of the Site.
5. Sampling Equipment and Procedures. Sampling procedures must be clearly written. Step-by-step instructions for each type of sampling that are necessary to enable the field team to gather data that will meet the Data Quality Objectives (DQOs). A list should include the equipment to be used and the material composition (e.g., Teflon, stainless steel) of equipment along with decontamination procedures.
6. Sampling Handling and Analysis. A table shall be included that identifies sample preservation methods, types of sampling jars, shipping requirements, and holding times. Examples of paperwork such as traffic reports, chain-of-custody forms, packing slips, and sample tags filled out

for each sample as well as instructions for filling out the paperwork must be included. Field documentation methods including field notebooks and photographs shall be described.

Each Field Sampling Plan submitted as a part of the Project Operations Plan for the RD/RA shall be sufficiently detailed to carry out the study, and shall provide data needed to address the objective of the study and to complete the study. Each study shall be designed to achieve a high performance on the first attempt. Each work plan shall be related (by cross-references) to the other requirements in the Project Operations Plan.

In the Field Sampling Plan for the RD/RA, the Performing Settling Defendants shall include plans that describe how each of the following and other necessary studies shall be addressed:

1. site survey;
2. soils and sources of contaminants;
3. subsurface and hydrogeological factors for overburden and bedrock;
4. air quality;
5. surface water and sediment sampling;
6. ecological assessment; and
7. monitoring and sampling.

**C. Health and Safety Plan (HSP)**

The objective of the Site-specific Health and Safety Plan is to establish the procedures, personnel responsibilities and training necessary to protect the health and safety of all on-site personnel during RD/RA. The plan shall provide for routine but hazardous field activities and for unexpected Site emergencies.

The Site-specific health and safety requirements and procedures in the HSP shall be updated based on an ongoing assessment of Site conditions, including the most current information on each medium. For each field task during the RD/RA, the HSP shall identify:

1. possible problems and hazards and their solutions;
2. environmental surveillance measures;
3. specifications for protective clothing;
4. the appropriate level of respiratory protection;
5. the rationale for selecting that level; and

6. criteria, procedures, and mechanisms for upgrading the level of protection and for suspending activity, if necessary.

The HSP shall also include the delineation of exclusion areas on a map and in the field. The HSP shall describe the on-site person responsible for implementing the HSP for the Performing Settling Defendants representatives at the Site, protective equipment personnel decontamination procedures, and medical surveillance. The following documents shall be consulted:

1. Interim Standard Operations Safety Guides (Hazardous Response Support Division, Office of Emergency and Remedial Response EPA, Wash. D.C. 1982);
2. Superfund Public Health Evaluation Manual (OSWER Directive 9285.41, EPA/540/1-861060, EPA 1986);
3. Hazardous Waste Operations and Emergency Response Standard (Department of Labor, Occupational Safety and Health Administration, (OSHA) 29 CFR Part 1910.120); and
4. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities: Appendix B (NIOSH/OSHA/EPA 1986).

OSHA regulations at 40 CFR 1910 and Chapter 9 of the Interim Standard Operating Safety Guide, which describes the routine emergency provisions of a site-specific health and safety plan, shall be the primary reference used by the Performing Settling Defendants in developing and implementing the Health and Safety Plan.

The measures in the HSP shall be developed and implemented to ensure compliance with all applicable state and Federal occupational health and safety regulations. The HSP shall be updated at the request of EPA during the course of the RD/RA and as necessary.